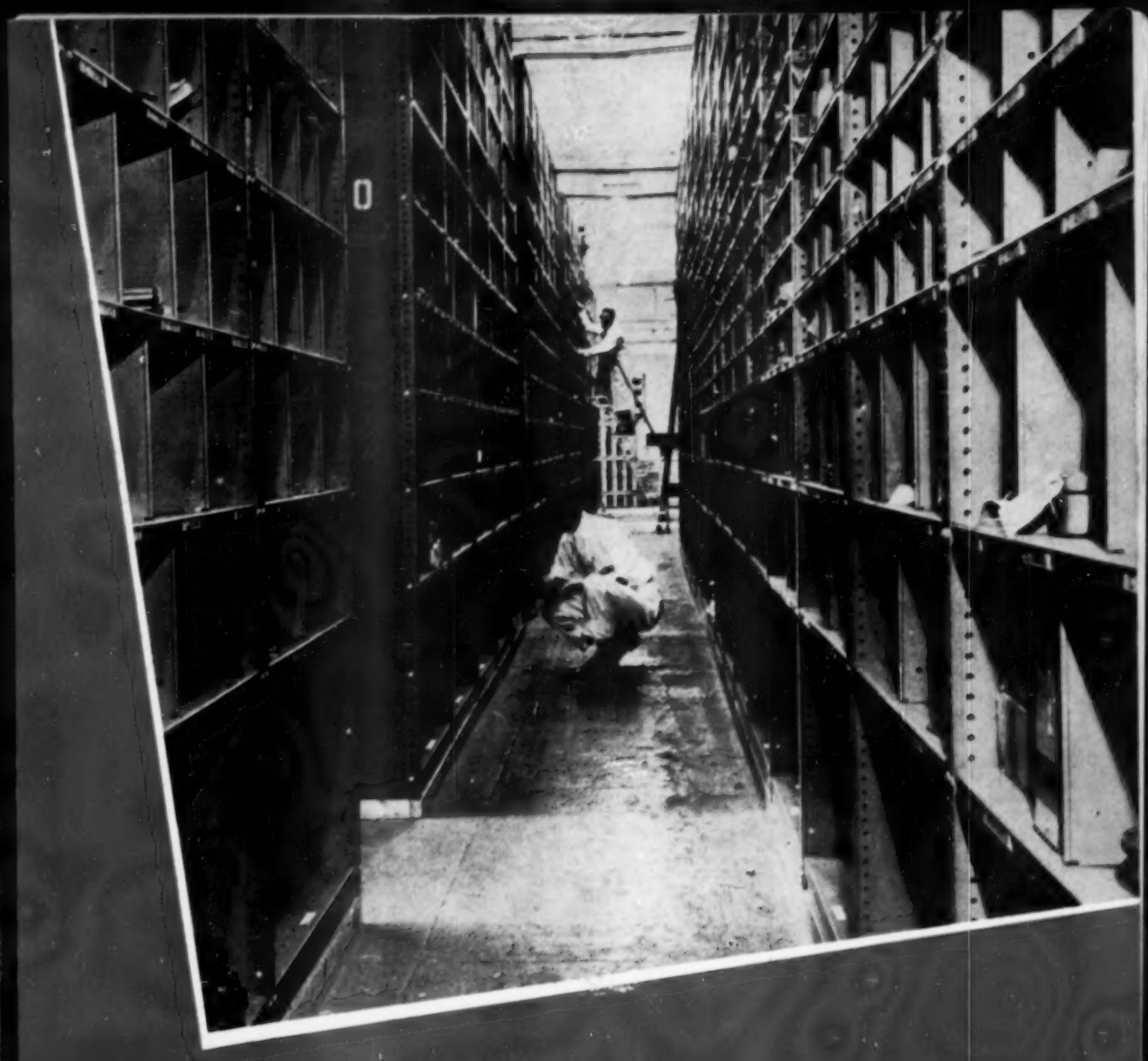

Safety Maintenance and Production

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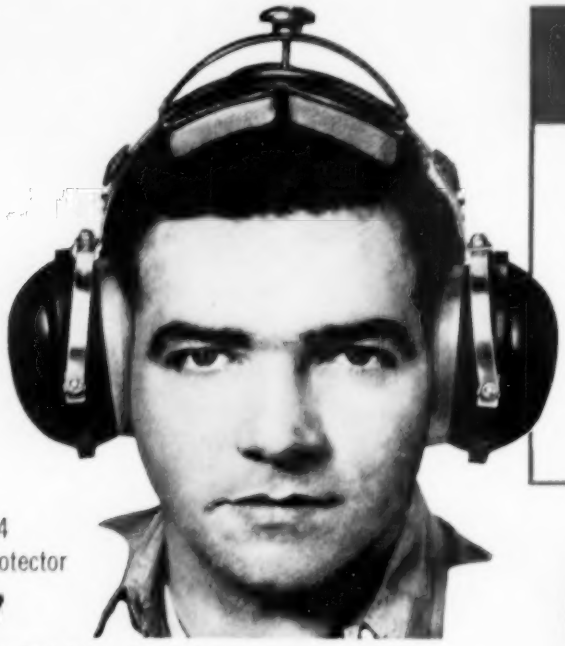

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for Regular Use

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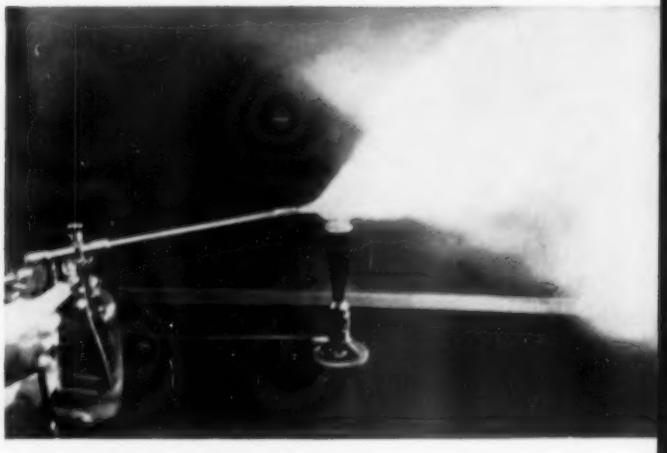
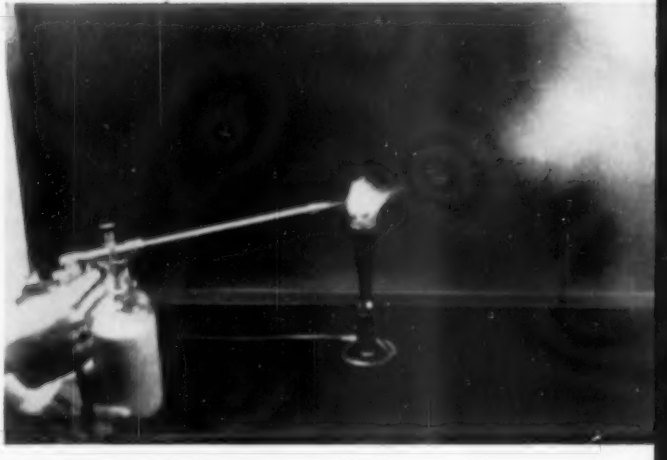


This photo shows the instant combustion taking place when a conventional hydraulic oil of mineral oil type is atomized over a Bunsen burner.

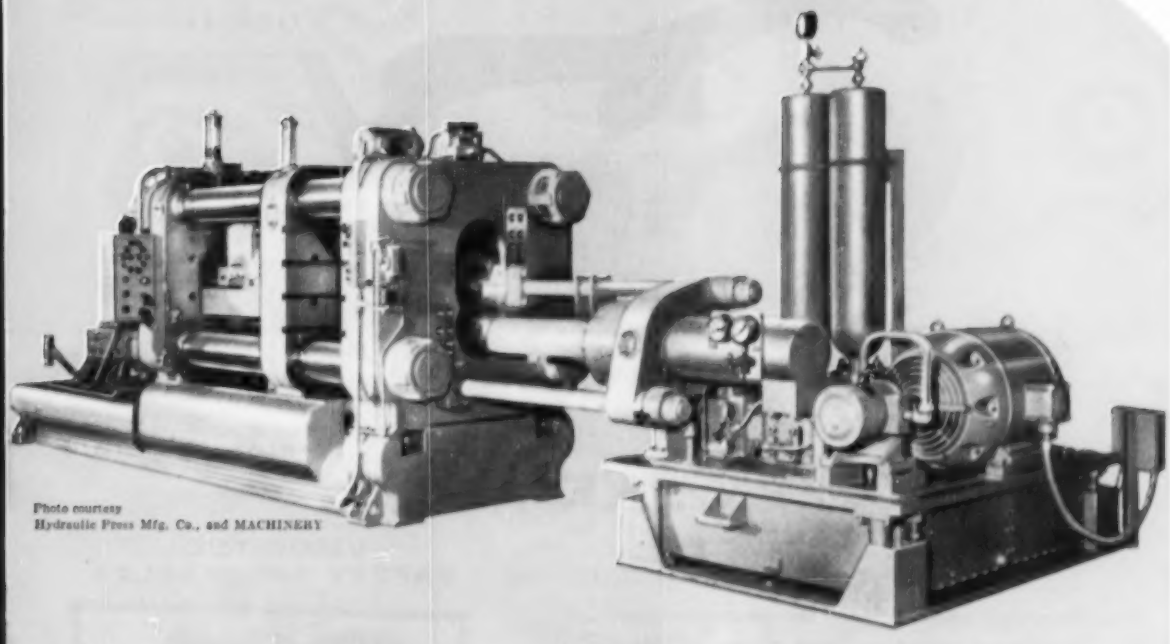


In this photo, Shell Irus Fluid 902 replaces the mineral oil. Note that there is no ignition.

SHELL IRUS FLUID 902

Oil-Base fire-resistant FLUID

SHELL IRUS FLUID 902



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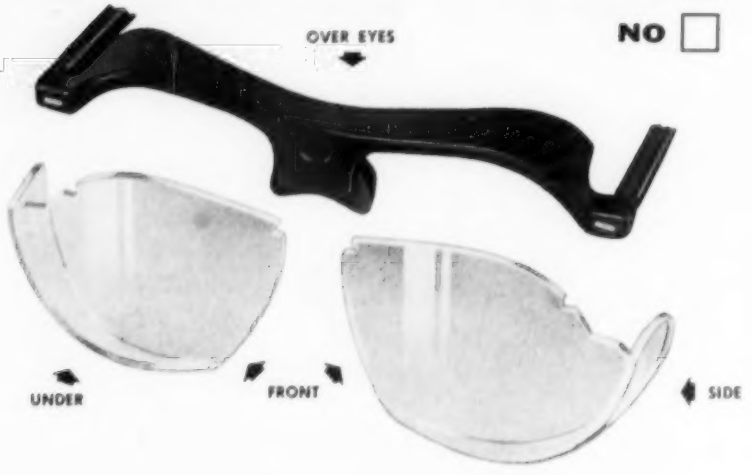
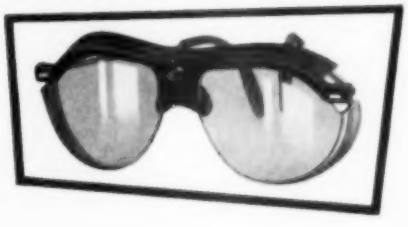


if you checked **YES,** *you need*

VISOR-TUC
SAFETY SPECTACLES



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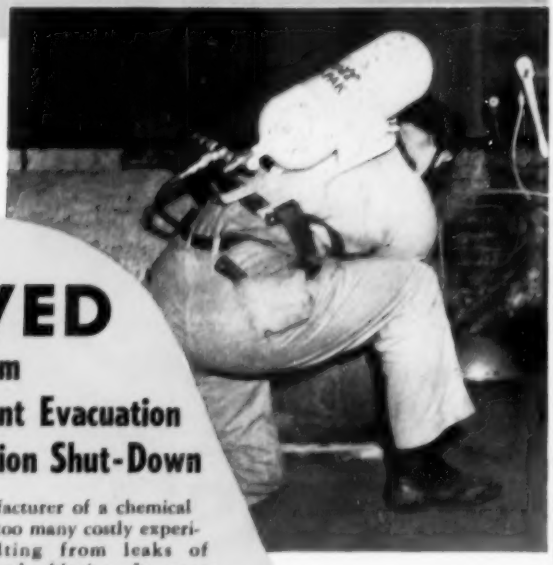

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it's SAFE to say

• SUMMER HAZARDS

STRANGELY enough, it often happens that the most technically-minded, dedicated safety director will spend years surrounding the men in the plant with every known safeguard and then go on his annual holiday without giving any thought to vacation hazards.

A case in point occurred recently when a safety engineer of rare accomplishment, a man who is a walking authority on accident prevention, actually acquired the grandfather of all sunburns! Either it's a case of "do as I say, not as I do" or the proverbial shoemaker's children without shoes.

Newspapers and the general magazines leave standing in type every year their hints for the vacationer and therefore the public at large has ample access to tips for avoiding accident pitfalls while on holiday. But when a professional safety engineer stretches out on his back, face up under a semi-tropical sun for hours at a time in his search for an enviable tan, with the inevitable result, that is news!

Obviously, the list of holiday do's and don'ts is too long for listing in these columns, nor should it be necessary to warn safety-minded readers against the perils of sunburn, unsafe driving habits, possible drowning, and all the other dangers which can beset the man who locks up his safe practices at five o'clock.

• ANOTHER FALLACY EXPLODED

LONG before the days of the elaborate salary check, and of course tax deductions, perhaps man was paid for his work with salt instead of dollars. If true, then there is a very definite reason for the expression, "a man's worth his salt." He still is! Especially if he is on so-called hot jobs in a plant or doing outside work in torrid temperatures, resulting in profuse perspiration.

Medical authorities are in agreement that loss of body salt through prolonged periods of heavy perspiration can result in fatigue, muscular cramps and prostration. Scientific studies conclusively prove that this salt must be replaced to restore the necessary balance and counteract the harmful effects of excessive heat.

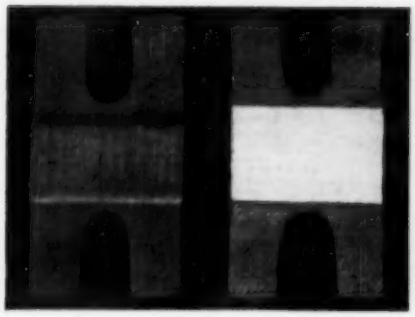
Unfortunately, too many of us are prone to accept pre-digested opinions. Let a pet theory gain credence in any single group or community and very soon it begins to take on the aspect of irrefutable fact. This type of reasoning, perhaps, is responsible for the widespread fallacy that salt replacement following profuse perspiration can cause hardening of the arteries or some dire digestive upset.

Several years ago, SAFETY MAINTENANCE undertook a survey to test the value of the theory that salt replacement was an open door to hardening of the arteries. Many outstanding medical authorities were consulted and their views not only refuted the belief that salt replacement was harmful but, to the contrary, testified to the value of salt in the prevention and treatment of heat fatigue in industry.

The associate surgeon of a giant steel company reported, "if salt is taken in moderate quantities and where indicated, no harm will come to the kidneys or blood vessels." A representative of the U. S. Public Health Service, wrote "so far as I know there never has been evidence presented to indicate that one may expect any deleterious effect from the administration of the amounts of salt necessary for prevention of heat cramps." In no case, was any contrary opinion expressed.

When eminent authorities in medicine agree that salt replacement is essential following exposure to work resulting in profuse perspiration, we can safely assume that it is time to lay one more fallacy to rest and that the industrial man is indeed "worth his salt." H.A.

NEW! unit first aid packets



KNUCKLE BANDS

These new bandages are a necessity for every modern first aid supply. They are the only convenient method of covering knuckles, fingertips and other places where ordinary dressings are inadequate. Sterilized and packaged individually in unit packs of 8 or 16.

NEUTRALIZE
for acid or alkali burns

Neutralize instantly counteracts caustic action of either acid or alkali, rendering the chemicals harmless. May be safely used in the eyes or on the skin. No time loss determining whether chemical is acid or alkali. In polyethylene containers 4, 8 and 32 ounces.

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built to last

The long life of Bullard first aid kits means savings to you. These kits, in the new Hammertone finish with removable gaskets, are weather-proof and dust-proof. Snap locks and back hinges are spot welded to prevent air leaks. Under the most rugged conditions, Bullard kits are always ready for instant use. Special unit packs are available.

UNIDROP

Eliminate danger of contamination and irritation from applying antiseptics with old fashioned cotton swabs. With modern Unidrop tubes, a gentle squeeze of the polyethelene, brown tube releases merthiolate one drop at a time — there is no contact between wound and applicator. Available in bulk and in Unit packs.

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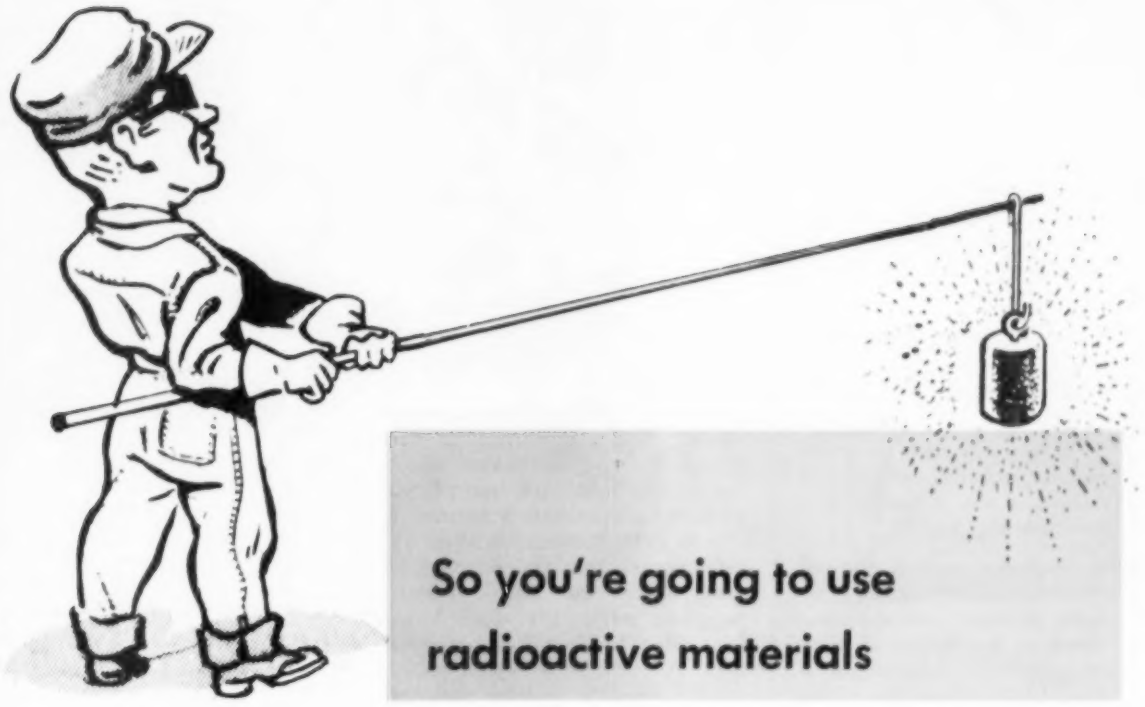


So you're going to use radioactive materials

Editor's Note: The following article is based on material in the "Instructor's Handbook" issued by the Safety and Fire Protection Branch of the U. S. Atomic Energy Commission. Further information for obtaining copies of the "Instructor's Handbook," the "Radiation Safety Primer" which is designed for distribution to employees, or sets of color slide training films will be found at the end of the article.

The introduction of radioactive materials into industry poses many special problems in the protection of personnel. One of the most serious problems is the proper training of employees so that they will be neither unduly alarmed by the presence of radioactive materials or radiation hazards nor, on the other hand, will they ignore them because of a mistaken sense of bravado.

The employee's basic knowledge of radiation hazards may well be compounded of atomic-bomb explosions, fallout, in the case of older employees the radium-dial painting accidents in New Jersey many years ago, and, in some cases, a belief that anything radioactive "lights up." This basic "knowledge" is not always helpful to say the least. In addition, the employee is then confronted with special precautions and procedures, special medical examinations, including variously, breath samples, urine samples, blood samples, and stool samples. Furthermore, persons highly trained in the field of radiation protection are not always successful in explaining these matters to the layman.

All these considerations point up the need for a simple nontechnical explanation of the hazards of radiation and the protective measures required.

The purpose of the "Radiation Safety Primer" (Second Revised Edition) is to present to the employee:

Fundamental concepts of the hazards of radiation.

What is done to protect him.

What he must do to protect himself.

In the education of laymen in radiation safety, the point cannot be emphasized too strongly that it is first necessary to give him an understanding of the nature of the hazard **to him** and how it is proposed to protect **him,** before any attempt is made to familiarize him with technical jargon and expose him to some elementary nuclear physics.

Radiation hazard is simply another hazard which can be controlled. We must avoid being so concerned with the radiation hazard that we lose sight of the other

RADIATION

LIKE ELECTRICITY

CAN BE

...HARMFUL IN

LARGE AMOUNTS

/

SAFETY

RULES MUST BE OBSERVED !

Table 1.

EXTERNAL RADIATION

1. Originates from a source outside the body, such as a piece of radioactive metal. The radiation from it goes through the body doing damage as it goes.

2. Can be given off by radiation machinery or by radioactive materials outside the body.

3. Any radioactive material which presents an external hazard is also a hazard if it gets into the body.

4. Protection against external radiation is accomplished by time, distance, and shielding (limiting the length of time of exposure; maintaining a safe distance from the radioactive source; or using shielding devices such as protective clothing, lead or concrete walls, special containers, etc.)

INTERNAL RADIATION

1. It is given off within the body by radioactive materials, such as fine dusts, which are taken into the body generally by swallowing or breathing.

2. Is given off within the body by radioactive materials deposited in the body—as in the lungs, stomach, kidney, or bones.

3. Some radioactive materials, such as polonium, are only an internal hazard and present little or no external hazard.

4. Protection against internal radiation is accomplished by keeping the material out of the body, by using exhaust systems and dry box enclosures, wearing respirators, using covered containers for radioactive materials, wash-up before eating and shower at the end of the day, wearing work clothes provided, etc.

hazards which can cause serious injury or death. Even in the Atomic Energy Commission, which has an excellent safety record, the proportion of radiation injuries is minute. For instance, over an 11-year period two people died of radiation in the atomic energy program, while 184 were killed from other accidental causes of the same nature as those which caused fatal injuries in private industry.

SHIELDS OF VARIOUS TYPES ARE PROVIDED

In many ways, radiation is comparable to electricity. Both are found in nature and can also be created by man. Neither one can be safely detected by the senses but only by means of special equipment. They both serve man yet demand respect. The penalty for disrespect is death. Today we handle high electric voltages with carefully thought out safety procedures. The same can be done and is being done for radiation.

Until now, the usefulness of naturally radioactive materials has been rather limited. Still, man has made radioactivity work for him. The radium dial on a wrist watch is an example; the use of radium for the cure of cancer is another. Practically everyone has received

WASH UP

BEFORE YOU EAT.

EAT *in the* LUNCH ROOM

— WHETHER YOU BRING IT OR BUY IT.

BROOMS STIR UP DUST

VACUUM CLEANERS

dosages of X-rays, if only in the dentist's chair.

To the layman employee some distinction should be made between the infinitely various levels of radiation hazards. But particular reference should be made to the specific materials handled in his plant and the levels of radiation involved.

It is important to explain the conservative basis of permissible radiation levels and also why personnel must keep below these levels. But it is equally important to explain that if the levels are occasionally violated slightly no real harm is done, but that prompt action must be taken to eliminate the condition which caused the overexposure. It is necessary to create an atmosphere in which, on the one hand, careless overexposure is not tolerated but, on the other hand, an employee does not get all upset and start to imagine all sorts of ailments because of an insignificant overexposure.

There are many people and devices whose job is the protection of the employee in radioactive work, including: radiation measuring instruments, exhaust hoods and other dust control equipment, doctors, radiation film badges, special clothing (which may be provided and laundered by the plant). But the most important protective factor is the employee himself.

What can the individual do to protect himself? First he must have some understanding of the two different types of radiation hazard:

1. Some radiation goes through the body like X-rays. This is External Radiation.

2. He can also receive radiation by swallowing or breathing radioactive materials. This is Internal Radiation.

The differences between these two types of radiation is vitally important in terms of safety procedures. Some of the most salient differences are outlined in Table 1.

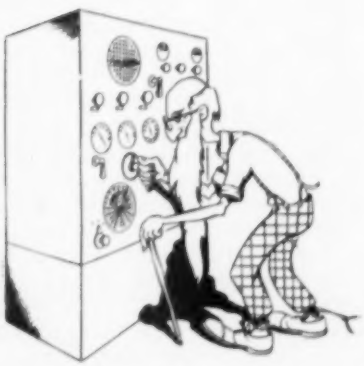
When the employee understands what the hazards of radiation are and what safety rules or procedures must be followed, he still needs to know what will happen to him if he breaks the rules. And the answer to that is, "It all depends."

It is vitally necessary to distinguish between the degrees of hazard. While it would be ideal to have the same degree of compliance with all safety rules, we must face up to the fact that we can prevent **serious** accidents only by pinpointing those conditions under which serious accidents are likely to happen.

If the distinctions between serious and minor hazards are not drawn for the employee, he may draw them for himself, probably on an erroneous basis. He must be made to understand that if certain rules are ignored, the result is sudden death; in other cases, immediate illness; and for still other rules, nothing at all happens right away but continued breaking of the radiation safety rules can mean eventual trouble in the future.

It's equally important not to cry "wolf." If the hazard is chronic rather than acute, the situation should be explained truthfully. Chances are that most employees have at some time violated safety rules; but it should be made clear that while a single inadvertent violation may, in some cases, cause no physical trouble, such violations

(Continued on page 39)



EMPLOYEES WHO OBEY RULES CAN WORK A LIFETIME SAFELY IN THIS PLANT.

Surface Grinding

Above is an inverted vertical-spindle grinder. Note operator has his eyes well protected.

Single Flat Surfaces

One interesting type of surface grinder provides an unusual approach for grinding single flat surfaces on some kinds of parts. While used chiefly on parts where only a single surface is needed, it can be employed for preliminarily surfacing one side of a rough piece which is to be ground in parallel, after which this first-ground side may be turned down on a magnetic chuck on various other types of surface grinders. By this means, very accurate work can be provided.

The machine used for the preliminary generating of a single flat surface, or for grinding a single flat surface when nothing more is required, is a massive vertical-spindle machine, with a special segmental type of wheel, grinding face turned upward. Many times, the weight of pieces being handled is sufficient to provide adequate pressure against such a grinding disc by gravity. At the most, only a small amount of manual pressure is required for supplementing the power of gravity. This greatly adds to safety of any grinding operation where the hands of an operator must be brought close to the surface of the grinding disc.

Has 53-Inch Disk

The disc on this particular type of machine is 53 inches in diameter, and the unit is often referred to in offhand manner as a "tub" grinder. It is particularly suitable for grinding single flat surfaces on parts where the final dimension need not be held to close limits. In many instances, therefore, it has been found ideal for finishing gear covers, stove doors, foundry flasks and similar parts.

Obviously, on this type of work (as on any where the operator must get his face relatively close to the grinding action) goggles are a necessity and should always be worn. The machine is arranged with a stop, against which workpieces are held. This stop prevents the moving disc from carrying workpieces around, so it is a simple matter for the operator to hold them in proper position.

Picture by courtesy of Mattison Machine Works.

Reducing Risks from Ladder Falls

by LYNE S. METCALFE

Extensive and ever-widening stocks of parts and merchandise carried by factories and dealers have long presented a major problem: moving them to market or shop with efficiency.

Storage of parts and saleable items and their handling from delivery to sale or shipment comprise an important, and perhaps an increasing, share of operating costs. Leading employers seek to: (a) speed this handling, (b) maintain facilities for stock-room personnel that are safe and that cause a minimum of work fatigue, and (c) keep orderly stocks at all times.

Achieving Objective

The achievement of these objectives depends upon: first, an effectual method of marking and listing items; second, modern and well planned and installed shelving and bins; and third, "getting-at-it" facilities and equipment which are built to save stock workers' time, provide a good margin of personal safety, and help to bring the items and parts, as wanted, quickly to the hands of the stock worker.

Some estimates show that approximately 35 percent of all stock-handling costs derive from receiving and unpacking, checking, marking and getting the items into proper stock bins or shelving, keeping same orderly with inventories up to date, plus, handling for display, use or resale.

Perhaps no one factor has done more to cut this cost and to facilitate this work than the development of the aluminum stock ladder in its various forms. The object of ladder manufacturers who have had a hand in designing these new lightweight and rigid climbing aids has been to assure the user's safety, conserve his energy, give him freedom from fatigue as well as facilitate his work.

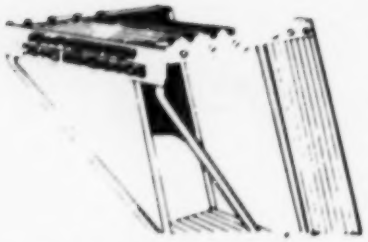
Features Numerous

The features of the modern aluminum stock ladder are numerous and revealing. And these features are of direct interest to the jobber or manufacturer who faces a parts or accessory stocking problem.

For one thing these ladders are extremely light and easy to handle. They can be moved quickly and, because of these factors, all of the clerk's stocks are more easily accessible. This, in turn, has much to do with the speed, accuracy and safety with which he can work. Also, as many women are being employed as stock-room clerks, the lightness and ease of handling of aluminum ladders is doubly important.

The "service" features designed into the aluminum stock-room ladders are of first importance. They include such features as high-strength extruded rails and steps; and a big ladder top or shelf is provided so that the stockkeeper may have ample working room to handle his materials and items "off the floor."

Stock stepladders have riveted cross braces on the rear assembly of the ladder to add strength. A



Wide shelf rest makes it easy and safe to use against narrow shelf edges.

pinch-proof folding mechanism is achieved by the use of specially designed spreader bars. Cadmium-plated rivets at all pivot points prevent the ladder from getting wobbly.

There are also deep corrugations in the ladder steps for sure-footed safety and they permit more comfortable and speedy climbing. An extra bracing is also provided under the front ladder steps.

On the extension type of ladder, by means of a special process, rungs are hydraulically locked or forged into the sides of the ladder rails to prevent loosening through long periods of usefulness.

However, safety and stability factors are stressed in the development of the modern aluminum step-ladder as being of primary importance. This is largely achieved by giving ample spread between the side rails of the ladder, tapering from the bottom to the top step and from front to back.

Figures show that 17 percent of all accidents to workers are the result of falls. This being the case, management today is seeking stock-room equipment which also meets the psychological requirements of the stockkeeper's job. For instance:

a) unless a clerk **feels** safe on his ladder he may work too slowly or with less attention to the job he is doing

b) the new ladders are designed to make him feel safe—to inspire and hold his confidence

c) unless a clerk is schooled in the need for safety and in the ways to work safely, the best equipment may miss its mark.

A warehouse-stock room type of aluminum ladder widely used by the United States Government can be easily lowered and raised by hand. Automatic locks and safety "shoes" provide added protection.

Corrugated rubber non-slip safety shoes are used on ladders for more stability and protection so they will not slip on floor surfaces. The same is true of what are called "shelf-ladders" with a ribbed rubber buffer on the back edge making a safe and easy rest position against narrow shelving or bin edges. (This means that items normally out of the clerk's reach can be secured, placed instantly and with safety.)

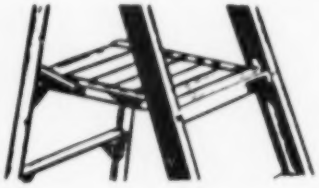
The ever-increasing use and development of high strength aluminum extrusions has been applied very practically to the manufacture of aluminum ladders. The extrusion process has not only improved ladders in general, but it has also made it possible to assure a higher degree of personnel safety and reduce hazards—factors which are of vast importance to management.

Said Mr. R. L. Werner, Chief Engineer of R. D. Werner Co., Inc., whose laboratories and factories have contributed a great deal to the development of aluminum ladders:

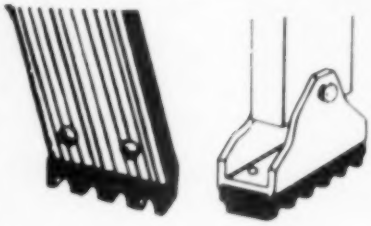
"The importance, in the cause of employee safety in industry and institutional management, of ladders and scaffolding which provide adequate protection against accident has long been recognized by safety engineers and foremen.

"Also, State industrial commissions and boards have laid down stringent codes concerning the specifications which this equipment must meet, and the conditions under which it is to be used, as in the case of scaffolding. One factor that has contributed greatly to the design and production of built-in protective features for ladders is their manufacture from aluminum and the fabricating process known as extrusion. The result is that, today, the aluminum ladder is scientifically designed and manufactured with safety features based upon long and careful research work and field testing. The maintenance problem, being a major factor in building management today, is usually productive of a higher accident rate than in other phases of operation, and more and more off-floor and off-ground work is being given more attention in connection with safety programs.

"Furthermore, aluminum ladders and aluminum scaffolding bring a new speed, efficiency and ease to this kind of work in that they are light to handle, easy to use and provide features which tend to reduce greatly the worker 'fatigue' rate. In other words, they tend to reduce costs, to speed and improve work, and to bring to bear certain advantages along the lines of worker morale."



Platform type ladders provide a more comfortable, larger and safer working area.



Slip-resistant feet are essential in the safe performance of extension ladders or stepladders.

The significant part of the ladder development in recent years, and in light of changing needs, is, without doubt, the development of ladders for many special purposes with features designed to meet those purposes. There are a number of aluminum ladders today designed with the needs of the retailer and the job in mind. To this end studies in the laboratory and the field have been made to discover the precise needs of the trade. Efficiency has demanded this, as has safety and aid, in combating rising labor costs.

So many business firms, in order to use every foot of their high rent or high cost storage space, must store and stock goods high above the floor. Studies in efficient handling seem to be imperative.

Pictures by courtesy of R. D. Werner Co., Inc.

75 Uses For Floor Absorbents

1. ACIDS. Use the granular absorbent as a packing between a glass carboy (or other breakable shipping container) and the outer shipping crate or carton. In case of breakage, it absorbs the acid or any liquid, eliminates fire and burn hazards.

2. ANNEALING. Bury hot carbon steel for cooling in absorbent instead of sand or metal chips. It gives better insulation and protection, and provides slower, more uniform cooling.

3. BELTS. To dry oil-soaked belts, bury in a box of the absorbent with coils about an inch apart. To increase traction of belts while in operation, sprinkle with absorbent.

4. BRUSHES. All kinds are easily cleaned, deodorized or bleached when buried in absorbent for a few days.

5. CANNING PLANTS. The granular material quickly dries spillage of oil, grease, acids, solvents, syrups and other liquids.

6. CARBON BLACK. Use absorbents to remove from floors of rubber factories or any plants using carbon black in processes.

7. CAULKING. Before caulking, recondition and dry floors with absorbents.

8. CELLARS. Dampness, condensation and odors are reduced or eliminated with a carpet of absorbent.

9. CLOTHING. Loosen oil and grease spots with solvent and then apply absorbent for quick removal.

10. COLD DRAW SHOPS. Lubricants and coolants used in wire drawing are readily absorbed from floors.

11. COLD STORAGE PLANTS. Material absorbs condensation, blood, grease and other liquids—eliminates slipping hazards.

12. CONCRETE FLOORS. Absorption of oil and grease prevents deterioration, slipping, fire hazards. (See Figure 1)

13. CRANES. Eliminate skidding accidents on greasy walkways with absorbents.

14. CRYSTAL CUTTING. Light oils used in this process are quickly absorbed from floors.

15. CYANIDE TREATMENT OF METALS. Racks used in case hardening of metal parts are dipped in molten cyanide, quenched in oil and finally cleaned in boiling water. Burying them in absorbent before redipping in cyanide removes danger of explosion caused by retained moisture.

16. DEODORIZER. When used on floors for general cleaning and absorption purposes, material has a deodorizing effect.

17. DERMATITIS. Absorbents help prevent skin troubles by drying out oil-soaked shoes and clothing.

Floor absorbents are primarily thought of as materials for soaking up oil and grease to prevent fires and falls. But don't overlook the many other industrial applications of these versatile products.

18. DUST. Oil-soaked absorbents make an excellent sweeping compound.

19. ELEVATOR SHAFTS. Absorb grease and oil accumulations at bottom of shafts with a carpet of fire-resistant absorbent.

20. ELEVATORS, FREIGHT. Spillage on elevator floors removed easily.

21. FILES, METAL. Rough surfaces are cleaned by burying files in absorbent, which removes accumulated oil and grease.

22. FIRE BUCKETS. Used as a filler, absorbent is a lightweight extinguisher. It prevents rust in fire buckets, and its dense, fire-resistant granules quickly smother flames.

23. FLOORS. All types of oil-and-grease-soaked floors can be reconditioned by absorbents before painting or refinishing.

24. FLOORS (FOOD STORES). Butcher shops and grocery stores find absorbents form a sanitary carpet where local regulations permit.

25. FLOORS, TILE. Where walls sweat during humid weather, bank an inch of absorbent at the baseboard. It will absorb drippings. A light blanket of the granules on the floor absorbs condensation.

26. FOOD CONTAINERS. Use as a cushion or shock absorbent for food products packed in glass, especially liquid foods. It helps prevent breakage, and should breakage occur, absorbs overflow so labels and other containers remain unsoiled.

27. FORGINGS. Bury in absorbent for slow, uniform cooling.

28. FREEZING UNITS. Absorbents take up moisture from floors. When banked around walls, they absorb condensation.

29. FURNACES. It serves as an excellent fire-proof filling between fire-brick and outer metal cover.

30. GARAGES. Absorbent removes oil and grease, draws up stains and accumulations, restores original floor color without scrubbing or flushing. Once floors are clean, keep them that way with a perpetual carpet of absorbent under repair jobs and lifts, around oil highboys, lubricating racks and pits. (See Figure 2)

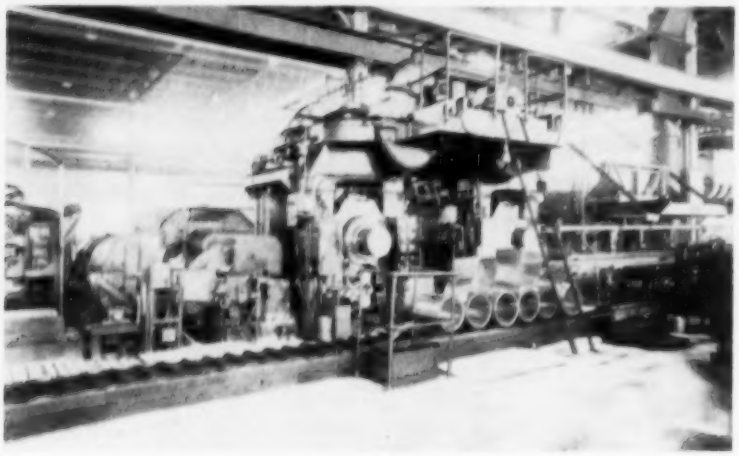


Fig. 1

31. GARBAGE. Place a one-inch layer of absorbent at bottom of garbage containers and sprinkle granules over each additional filling of garbage. It deodorizes the refuse and discourages insects.

32. GLOVES. Absorbs grease from work gloves (rubber, leather, cotton, etc.). Gloves should be filled and covered with the absorbent to prevent shrinkage.

33. HEAT TREATMENT. Heat-treated parts of equipment, after immersion in oil, are dried swiftly and completely with granular absorbents.

34. HOSES. Bury rubber or woven hose in absorbents to clean and preserve by eliminating oil-rot. Especially useful for this purpose in garages, service stations and industrial plants.

35. INDUSTRIAL PLANTS. Eliminates slipping and fire hazards, and prevents deterioration of oil-soaked floors.

36. KITCHENS. Grease splashed removed from walls. On floors, it prevents slipping and fire hazards near stoves.

37. LAVATORIES. Odors eliminated and sanitation improved when absorbents are properly used on floors.

38. LIFTS, LUBRICATING. Grease deposits picked up, fire and slipping hazards reduced, oil tracking into vehicles avoided with absorbent treatment.

39. LIGHT. When spread on floors otherwise dirty, the absorbent's whiteness reflects more light, improves visibility and working conditions.

40. MANDRELS. Before tubing is drawn, clean mandrels with absorbent.

41. MASTIC FLOORS. Preserved longer when kept free of oil and grease deposits by treatment with absorbents.

42. OPTICAL WAX. (Jewelers Rouge). Build-up of material on floor prevented by absorbent.

43. PACKING PLANTS. Absorbs oil and grease under machinery and conveyor belts.

44. PARTS, METAL. Oil film removed from machined or finished metal parts by burying or tumbling in absorbent.

45. PATTERNS, WOOD. Production speeded, warping prevented when absorbent is used to draw moisture from wood patterns after they've been set in damp sand.

Fig. 2

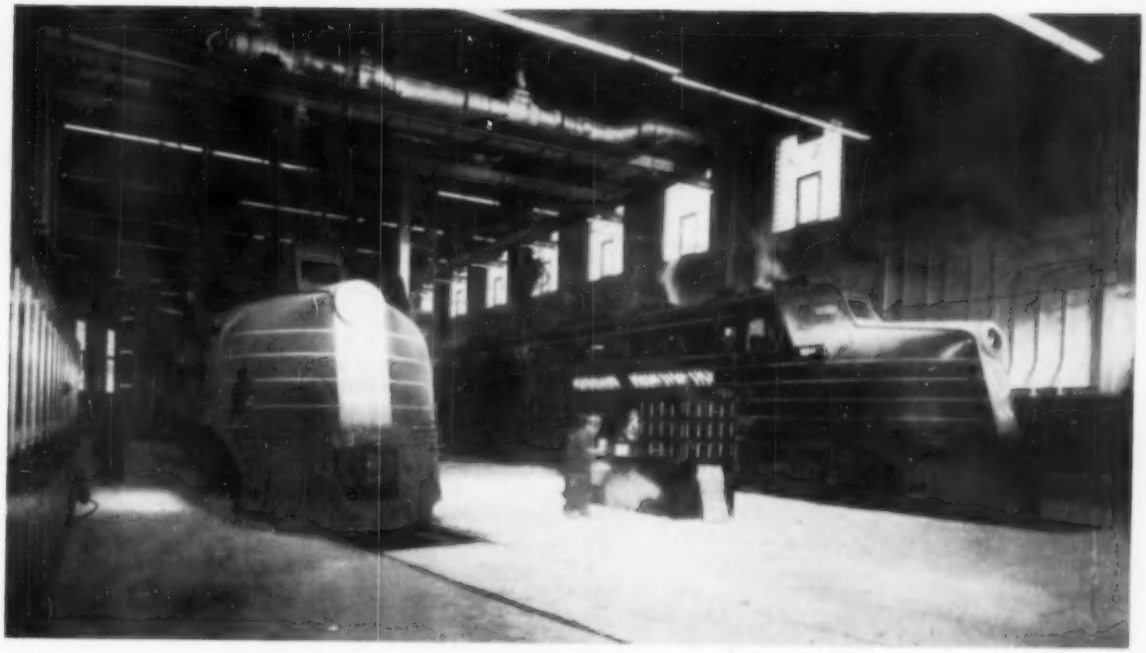


Fig. 3

46. PLATFORMS, LOADING. Prevent hand or motor truck skidding hazards by removing oil and grease.

47. POWER PLANTS. When transformers, motors, generators, etc. are under repair, absorbent quickly takes up oil and grease leakage and spillage.

48. PULLEYS. Increase traction by sprinkling with absorbent to remove oil coating.

49. RAILROADS. Absorbent takes up oil and grease drippings in repair shops. (See Figure 3.)

50. ROPE. Oil-soaked rope can be reclaimed by burying it in absorbent, with coils about an inch apart, until dry.

51. RUBBER TIRES. Absorbents eliminate grease and oil from tires, safeguarding them against deterioration.

52. SALVAGE AFTER FIRE. Carpets, draperies, stores, stocks, floors, etc. are quickly dried out after fires. Water that is promptly absorbed from wooden floors prevents costly buckling.

53. SAWS. Well cleaned by absorbents after quenching in oil.

54. SCRUBBING MACHINES. After scrubbing machine has been used on floor, a light carpet of absorbent removes any excess moisture, dangerous caustics or strong cleaning solutions.

55. SEPTIC TANKS. Use absorbent as a cleaning aid when overflow occurs and also to carpet bottom of tank when cleaning it.

56. SEWER CONTAMINATION. Odors and refuse absorbed when sewers back up.

57. SHOES. Oil-or-water-soaked shoes can be dried overnight when buried in absorbents.

58. SOLVENTS. Use absorbents to clean greasy floors instead of highly flammable solvents.

59. STABLES. Use absorbent under straw when bedding down horses, cows, or other livestock. It deodorizes, preserves floors, and makes excellent fertilizer when taken up.

60. STEEL PLATES. In shipbuilding or other processes where steel sheet or plate is used, use absorbent for quick removal of oil film left in manufacturing.

61. STORAGE TANKS. Absorbent dries up drippings around base and prevents slipping accidents.

62. SUBWAYS. Dangerous grease accumulations between tracks can be eliminated by absorbents. Also widely used in repair shops.

63. SYRUPS. Floor deposits readily absorbed.

64. TANNERIES. Floors can be kept free of acids and other liquids.

65. TEXTILE MILLS. Absorbents are highly effective in taking up oil around looms, weaving machines, spindles.

66. TEXTILE FABRICS. Textiles stained by oil during manufacture are cleaned without leaving stains and without damage to the finish by sprinkling with absorbent, preferably ground to a powder.

67. TRAYS, WORK. Cleaned and freed of oil by absorbents.

68. TRUCKS, MOTOR. Spillage picked up efficiently from floors of trucks.

69. TUNNELS, SERVICE. Freed of moisture and odors by absorbents.

70. VERMIN. Helps eradicate vermin when piled at baseboard or spread on floors.

71. WAREHOUSES. Spillage and leakage of all liquids taken up, and floors kept clean, odorless and sanitary.

72. WASHING MACHINES. Surrounding floor can be kept dry and safe underfoot by spreading absorbent.

73. WAX. A light carpet of absorbent frees floors of wax deposits.

74. WINES AND BEVERAGES. Solves spillage problems neatly.

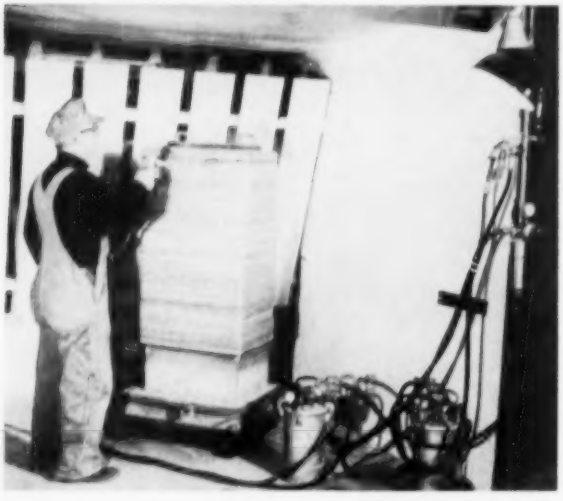
75. WOOD BLOCK FLOORS. Absorbent eliminates bleeding pitch, tar, creosote, etc.

By courtesy of Speedi-Dri Corp.

Operation and Maintenance

by J. F. McCASLIN
The DeVilbiss Company, Toledo, Ohio

The successful operation and the degree of maintenance on an exhaust system begins with the selection of the type of booth, its design, and a preventive maintenance program.



(Fig. 1) In this dry type spray booth the distributor plates provide uniform air velocity over the booth front, collect some of overspray.

(Fig. 2) Paint particles are removed from the air here by disposable filters. Easier fan maintenance and less drifting paint are result.

There are several types of exhaust systems, some as simple as the installation of a fan in the wall of a room for the exhausting of dust or lint. However, in industrial spraying, where it is necessary to localize and confine the overspray, the three principle types are: **(a) Dry, (b) Filter, (c) Water Wash.**

The type of material, speed of operation, and the amount and condition of the overspray has a direct bearing on the type of spray booth that should be used. Spray booths are designed to protect the worker from toxic materials that may be sprayed and also to prevent the creation of atmospheres that may prove explosive or flammable.

The simplest type of spray booth is the dry type which consists of a sheet metal enclosure, fan and exhaust stack. Distributor plates are located in the back of the enclosure and in front of the fan. The purpose of the distributor plates is primarily to give a uniform velocity of air over the entire front of the booth. They also act as a collection plate for some of the overspray. (See Figure 1.)

Dry booths for porcelain enamel usually have a double set of distributor plates for the purpose of collecting enamel in order that it may be reclaimed.

If a slow drying material such as a synthetic enamel is used, it is best to consider some means of preventing the solids from entering the fan and stack. An inexpensive method of doing this is to replace the distributor plates of a dry booth with filters. These filters can be either the washable or disposable type. (See Figure 2.)

The filter type booth is practical only when a small amount of enamel is being sprayed. Large volumes of enamel would necessitate frequent changing of the filters and a point is reached where the initial low cost of the filter type booth is offset by the maintenance cost.

It should be pointed out that both the dry booth and the filter type do present a fire hazard with some materials. The National Fire Protection Association has issued a set of standards on the operation, design and maintenance of spray booths. It is entitled "Standards for Spray Finishing Using Flammable Materials," or it is more familiarly known as N.F.P.A., Code 33. Their recommendations should be closely followed for the particular type of booth being used.

By far, the most practical exhaust system for production spraying is the air washer type. In the case of organic materials, the overspray goes directly from the booth area into a washer chamber where the solids are removed and only the air and vapors continue into

# of Spray Booths

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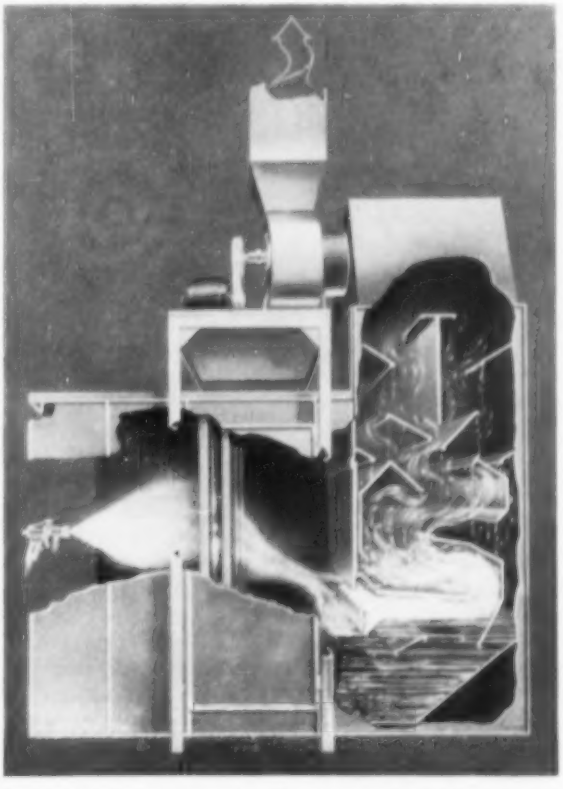
the exhaust chamber, stack, fan, and to the outside. Needless to say, the maintenance of the stack and fan is greatly reduced and the fire hazard is virtually non-existent. However, this is contingent upon proper maintenance of the system. For example, a certain manufacturing plant had a water wash booth in operation for approximately six months. The owners were most indignant when it caught fire, since one reason for purchasing it was the fire hazards presented by a dry type booth. Upon investigation, it was found that not only was their water wash exhaust chamber completely clogged, but they did not even know it had nozzles which were supposed to spray water. In short, the most careful booth selection and the finest design may fail miserably if its operating principle is not understood and there is no preventive maintenance program.

The average water wash exhaust chamber consists of a tank the width of the spray booth, three to four feet from front to back and filled with approximately sixteen inches of water. (See Figure 3.) A water pump circulates the water from this tank to one or more headers in which are located water nozzles on two to four inch centers. The spray developed by the water nozzles is directed at a throat through which the exhaust air enters the water wash chamber. In this manner, the spray of water knocks the solids back into the tank where they float on the surface and are skimmed off. In addition to the nozzles, the chamber has a series of baffles which remove excess water from the exhaust air.

Because of the extreme abrasiveness of porcelain enamel, water wash chambers with pumps and nozzles are not too practical. Where it is necessary to confine the porcelain enamel overspray so that it does not contaminate the area outside of the building, a water wash chamber is used which does not have nozzles or a pump. This chamber has a leveling bar or panel which just touches the surface of the water. (See Figure 4.) The velocity of the exhaust air created by a blower causes the water to be pulled up into the washer chamber as a spray which removes the solids from the exhaust air. The success of such a booth is dependent upon the use of such a material as porcelain enamel which will sink to the bottom of the tank. A porcelain enamel water wash booth still retains the double set of distributor plates since it is desirable to reclaim the enamel in the dry state.

If care is taken in selecting the proper booth for the type and amount of spraying being done, a more efficient operation with less maintenance will result.

(Fig. 3) Cross sections of water wash type of spray booth. Water curtain removes paint particles and prevents accumulation of fumes.



(Fig. 4) Here is a cross section of a spray booth used for porcelain enameling, ceramic finishing. It removes, reclaims abrasive overspray.

For instance, the production spraying of a baking enamel which remains wet long after it leaves the spray gun would present a continuous maintenance problem in a dry booth since there would be a constant accumulation of wet paint on the stack and fan as well as the outside of the building. This collection, aside from being a fire hazard and requiring constant cleaning, would affect the efficiency of the fan with the result that successful operation and maintenance would be virtually impossible.

The selection of the type of spray booth is dependent primarily upon the amount and condition of the overspray. As can be seen from the various types of booths just discussed, whether of the dry, filter, or water wash type, they all have in common this so-called booth section, or that portion into which the spraying is actually done. The efficient removal of vapors and overspray by a spray booth, regardless of its type, depends upon proper design of this section of the booth. The distributor plates, filters or air washer and the fan are called the exhaust chamber.

The design of the spray booth is basically proper proportioning of the booth section in relation to the velocity of air entering the booth.

The air from the average production spray gun travels at the rate of approximately 2000 to 3000 FPM at eight inches from the gun. This drops off rapidly as the distance increases until at 15 to 20 feet it is only a few feet per minute. An exhaust chamber to operate efficiently must have sufficient size to permit this high velocity air to expand and slow down in order that the air velocity into the front of the chamber will prevent it from drifting or rebounding out into the room.

For example, a small spray operation at one end of a very large room would probably have adequate exhaust with just a small fan in the opposite end of the room. The reason, of course, is that the exhaust chamber is large enough to allow the air from the gun, which is originally moving at high velocity and carrying atomized material, to drop down to a few feet per minute which, of course, would require only a low rate of exhaust to pick it up and carry it out the stack. On the other hand, if it was necessary to confine this overspray to prevent it drifting around this large room, then the booth section would be smaller. If it was such a size that the velocity from the gun had only dropped to approximately 150 feet per minute, then it would be necessary to have an air velocity into the front of the booth in excess of this.

In designing the booth section of an exhaust system, it is necessary to consider the following:

Size of the article being sprayed
Number of operators in a booth
Speed of application
Type of material being sprayed

If the article is stationary while being sprayed, the booth should be of such a size that there is at least two feet on each side of the article. The height of the booth is generally seven feet or at least 12 to 18 inches higher than the top of the article. The working depth of the booth is approximately that of the width of the booth and may have to be increased for large articles such as tables or automobiles to provide a distance of two to three feet from the back of the object to the front of the exhaust chamber. The front of the article is usually placed 12 to 18 inches inside the front of the booth.

If the article travels on a conveyor, the width of the booth should be of such size that the operator, from the time he starts spraying the object to the time that he finishes, will at no time have the gun spraying within two feet of either side. It is quite possible that such things as continuous sheets on a monorail conveyor may require more than two feet since there is a great tendency for the spray to follow the sheets out through the conveyor openings.

The width of the booth will also vary with the number of operators. How much space each additional operator requires will depend a great deal upon the type of operation. Two operators might spray small articles in an eight foot spray booth while two operators spraying larger articles may require a ten or twelve foot both. Two things must be considered; the necessary elbow room for each operator and additional area in the booth for the expansion of air from the spray guns.

The speed of application is important in booth design in that it is generally an indication of the air pressure used. As an example, a small touch up operation, or even production spraying, where lower atomization air pressures of 30 or 40 PSI are used, an air velocity into the front of the booth of 100 FPM would be sufficient. High production spraying usually requires air pressures of 65 PSI or higher and would require a spray booth velocity of 150 FPM. Automatic machines, which usually have a concentration of guns, may require a velocity of 200 FPM.

The type of material must be considered in selecting the booth velocity in that those which may present a health hazard, such as catalyzed finishing materials, porcelain enamel, and others, would require a higher velocity than normally recommended. Such materials usually are sprayed with a booth velocity of 200 FPM.

The air velocities just mentioned are an average for a properly sized booth. If, because of space limitations, it is necessary to use a smaller booth, then the air velocities would have to be increased. Having selected the proper size booth and the air velocity for the particular conditions at hand, the correct fan can be selected which will exhaust this volume of air against the static pressure set up by the exhaust system.

For example, if we were to spray a cabinet 2' wide, 4' long and 3' high, the exhaust booth would be 7' high by 8' wide. If this were sprayed with a furniture lacquer, the atomization pressure would probably be in the neighborhood of 45 PSI. Therefore, a 100 FPM velocity should be sufficient. A booth 7' high and 8' wide has an area of 56 square feet. This, multiplied by the velocity of 100 FPM is equal to 5600 CFM. This is the volume of air required to give adequate exhaust facilities in this operation.

However, there is a resistance set up by the exhaust chamber, ducts, elbows, dampers, and weather cap, which affects the efficiency of the fan. This resistance is measured in inches of water and is called static pressure. It will, of course, vary with the type of exhaust chamber, length and diameter of the stack, etc. A dry exhaust chamber, 30' of stack and one elbow

would have a static pressure of approximately ¼ inch. Therefore, if our booth has this amount of resistance, it would require an exhaust fan which would deliver 5600 CFM at ¼ inch static pressure.

Not only is it necessary to select the right type of booth, but it is equally important that it be correctly designed for a specific spray operation if it is to be operated efficiently with the minimum of maintenance.

Maintenance

The proper maintenance of a dry booth hinges on an effective and simple means of removing the overspray from the walls and ceiling of the booth, distributor plates, fans, and stack. This can best be done by the use of a coating which permits easy stripping of the paint accumulation. Booth coating is usually sprayed on the interior of booths prior to use. Scrapers used on paint booths must be of a non-sparking material.

Porcelain enamel booths are, of course, scraped down and or flushed with water. Such booths should be of non-rusting metal such as stainless steel, aluminum or galvanized steel. A sump and drain should be designed which will provide proper runoff of the water without clogging the sewer.

The maintenance of a filter type booth consists of cleaning or disposing of the filters at such times as will prevent their becoming clogged to the extent that they impair the efficiency of the booth. This is easily determined by the installation of a water gauge which indicates the static pressure through the filters. An initial reading with clean filters plus an allowable drop will tell at a glance if the filters require maintenance.

Again, in reference to the National Fire Protection Association's publication No. 33 states:

Dry Type Overspray Collectors–(Exhaust Air Filters). In conventional dry type spray booths, overspray dry filters, if installed, shall conform to the following:

(a) The spraying operations shall be so designed, installed and maintained that the average air velocity over the open face of the booth (or booth cross section during spraying operations) shall be not less than 100 linear feet per minute. Visible gauges or audible alarm devices shall be installed to indicate that the required air velocity is maintained.

Maintenance procedures should be established to assure replacing filter pads before excessive restriction to air flow occurs. Filter pads should be inspected after each period of use and clogged filter pads discarded and replaced.

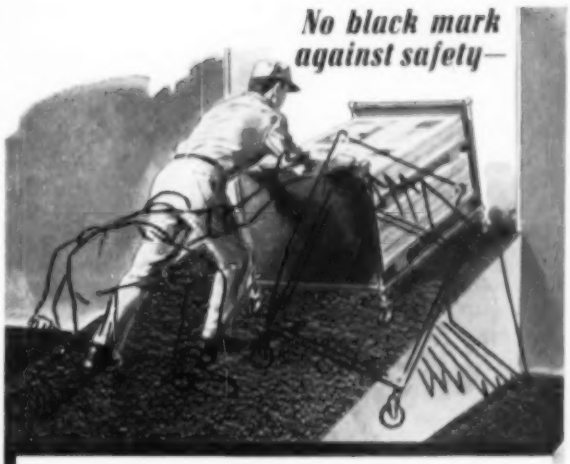
(b) All discarded filter pads shall be immediately removed to a safe, well detached location or placed in a water-filled metal container and disposed of at the close of the day's operation.

(c) The location of filters in a spray booth shall be so as to not reduce the effective booth enclosure of the articles being sprayed.

(d) Space within spray booth on the downstream and upstream sides of filters shall be protected with approved automatic sprinklers.

(e) Filters shall not be used when applying a spray material known to be highly susceptible to spontaneous heating and ignition.

(f) Clean filters shall be non-combustible or of a



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type having a combustibility not in excess of Class 2 filters as listed by Underwriters' Laboratories, Inc.

(g) Filters shall not alternately be used for the application of lacquer and other materials such as varnishes, stains, ground coats, etc. If such alternate application is conducted, spray booth and exhaust duct shall be cleaned of all traces of finishing material formerly applied and used filters discarded.

The booth section in front of the filters should be treated in the same manner as the dry booth.

As mentioned previously, the successful use of a dry booth or a filter type is dependent on the type and volume of overspray.

Keeps Sludge from Intake

The maintenance of a water wash booth is simply keeping the sludge collection from entering the water pump intake. If this is done, then, of course, there will be nothing to clog the piping and nozzles, or wear out the pump. However, apparently it is not as simple as this since the average water wash booth does have clogged nozzles and piping which permit the paint to find its way to the fan and stack. Maintenance, then, consists of cleaning the pump, piping, nozzles, baffles, fan, and stack, which, at best, is a very costly operation.

A properly operated water wash booth would require a weekly stripping and recoating of the dry section as in the case of a dry booth, draining and cleaning of the water tank and inspection of the nozzles to be sure they are all flowing water.

The main reason for the average water wash booth requiring considerably more maintenance than this is improper sludge collection, and perhaps too many people do not understand the basic operating principle of the water wash booth.

I remember one case where the paint actually ran out of the water nozzles. This was the result of someone recommending a water wash compound which would cause the paint to settle to the bottom of the tank. Proper operation was obtained by merely substituting a compound which caused the paint to float on the surface of the water as it is intended it should.

This process is known as "compounding." The purpose of compounding the water is to neutralize the paint so it does not stick to the exhaust chamber and to permit it to float on the surface of the water. The type and amount of compound will vary with the material being sprayed and it is possible that some materials might even be collected without the use of a compound. However, in this case, a rust inhibitor should be added to the water to prevent corrosion of the water wash chamber.

Once determined, the strength of the compounding must be maintained since it will become weaker as paint is sprayed into the booth and water which is lost through evaporation and the skimming operation is added. The concentration of the compound is determined by a process known as titration, which is merely an indication of the alkalinity of the water. The water should be titrated and the compounding brought back to its original concentration every four hours. A more recent development is the automatic addition of compound. This usually consists of a detector which automatically checks the strength of the compounded water and adds the necessary amount of the compound as required.

The requisites of a water wash compound are that it have rust inhibiting properties, will prevent the paint from sticking to the booth and that the paint sludge will have enough buoyancy to float on the surface of the water. With some paints, this is not difficult to achieve, while others present a rather difficult problem, and some compound will work well with some materials and not others and under some production conditions and not others. Booth compound should be purchased from a reliable concern with good service facilities. An improperly compounded water wash booth can soon operate as a dry booth with all its inherent maintenance difficulties and fire hazards.

Many times, even a properly compounded booth will clog. This is usually caused by letting the sludge become waterlogged and sink to the bottom of the tank. The sludge should be skimmed from the surface of the water every four hours and never permitted to stand overnight. Many companies have this sludge reclaimed, thereby achieving considerable economy.

Another fallacy is compounding a booth at the beginning of the day or after the booth is cleaned and not adding any until the next day, or even the end of the week. The compounding becomes weak as more paint and make-up water is added to the booth. As a result, a booth may be improperly compounded by the end of the day, unless, of course, compound is added periodically. With some paints, too much compound is as bad as too little; therefore, adding a little extra to carry the booth through the day may cause trouble.

Carelessness May Cause Difficulty

Carelessness may result in considerable difficulty. As an example, one company purchased a stripper to pump through their water wash booth during the weekend to clean out the pump, piping, and nozzles. This cleaned the system but they failed to drain out all of the stripper with the result that the water was improperly compounded during the next week. This condition continued until the stripper was completely drained, the system flushed out, and then properly compounded.

In conclusion, the successful operation and maintenance of spray booths is dependent upon:

(a) Selecting the right type of booth for the job and taking into consideration the amount and type of material to be used in painting.

(b) Correct design of the booth in regard to the size of the article being sprayed, the number of operators, whether or not it is conveyorized, and the necessary rate of exhaust.

(c) Finally, a complete understanding of how and why the booth functions, and a preventive maintenance program which insures efficient operation of the booth instead of an inefficient booth demanding maintenance.

From an address presented at the 26th All-Ohio Safety Congress. Pictures by courtesy of The DeVilbiss Co.

THE FIRE FRONT

May Losses Rise

Estimated fire losses in the United States during May amounted to $87,681,000, the National Board of Fire Underwriters has reported. This loss represents an increase of 22.1 percent over losses of $71,789,000 reported for May, 1955, and continues the trend that has been noticeable since the first of the year.

Losses for the first five months of 1956 now total $442,633,000, an increase of 11 percent over the first five months of 1955, when they amounted to $398,929,000. These estimated losses include an allowance for uninsured and unreported losses.

NFPA Meeting

Boston was host to "visiting firemen" from all over North America and several overseas countries for a week starting June 4th for the 60th annual meeting of the National Fire Protection Association. Delegates to the conference included fire officials and fire fighters, industrial fire protection authorities, equipment manufacturers, municipal and other governmental officials.

The NFPA is the source of most of this country's fire safety standards, codes and suggested ordinances. Over 30 such standards and codes, either new or revised, were considered for official adoption during the association's meeting.

Problems Discussed

The tremendous current growth of the chemical industry, one speaker told the fire marshals, is creating phenomenal new safety problems for fire departments and the communities they serve.

Fire Prevention Engineer Raymond M. Hill of the Los Angeles Fire Department reported that developments in the chemical industry "have been so rapid that many processes have been accomplished facts before proper safeguards and controls are developed."

He said, "materials which were laboratory curiosities or which were available only in test tube quantities last year are now being produced in tonnage volumes and being shipped throughout the country in drum and tank car lots."

Aviation fire safety experts meeting concurrently with the fire marshals heard one speaker describe how fire prevention, fire detection and fire control were planned into the Boeing 707 commercial jet transport.

Transport Fuel Load

Boeing design engineer O. E. Kirchner told the NFPA aviation fire safety seminar that safe fuel containment, elimination of ignition sources and isolation of the jet power unit were among the basic fire considerations and early design requirement of the new 707.

At the same morning session, aviation fuels expert A. R. Ogston of Esso Export Corp., New York, pointed out that the new jet transports, both the Douglas DC-8 and the Boeing 707, will each have a capacity of nearly three tank car loads of fuel.

When you consider also, he said, "that takeoff and landing speeds and the length of the takeoff and landing runs will be greater than has been practiced hitherto, the question of any influence that the fuel may have on fire safety takes on added significance."

He described the two jet fuels available for transport use—kerosene and a gasoline type fuel known as JP-4. Of the two, he said, kerosene would be the safest "in the case of the landing or takeoff accident resulting in damage to the airplane's fuel tanks."

Kerosene was also claimed to be the more firesafe under high altitude flight conditions where previously JP-4 had been thought to present the least potential hazard.

Tank Leaks

At least 10 percent of all underground gasoline and other petroleum storage tanks are leaking and fumes are entering sewers and buildings "causing explosions and loss of life and property," according to Ohio State Fire Marshal Charles R. Scott.

Stressing the peril, Scott told the Fire Marshal's Section that vapor from one gallon of gasoline mixed in certain proportions with air has "the same explosive power as 87 sticks of dynamite."

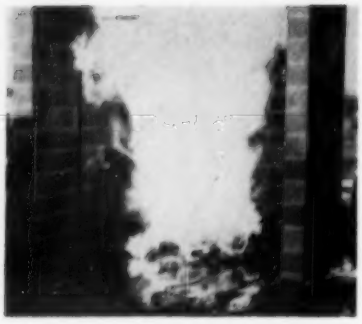
Enforcement officials must undertake the elimination of these hazards, he said, asserting that owners and others using such underground storage frequently avoid their responsibility to stop leaks.

Scott declared the existing air-pressure tests for such underground tanks is often worse than useless. Compacted clay and earth around a tank may actually make it difficult to get any sound evidence of leakage with this method. And he said the pressure might actually increase holes in corroded or defective equipment.

He expressed the opinion that the only dependable method is a gravity test in which the tank is filled with fuel and then, with a reading device, actual leakage of fluid by gravity is disclosed.

"If the liquid level declines in the supply piping, there is only one answer," Scott said: "It is leaking and there is only one way to find it—dig, dig and keep digging until it is found." He said 90 percent of

(Continued on page 39)



(Fig. 1) Unwound nitrate film, loosely piled, burns very quickly, gives forth radiant heat.

(Fig. 2) In contrast, safety film burns very quietly. Also slowly, like small paper scraps.

(Fig. 4) Nitrate films shoot out widely here from this simulated motion picture projector.

(Fig. 5) With safety film it is hard to see fire. Flames die in closed magazine.

safety film can

by **ALLEN J. COBB**
Safety Director
Kodak Park Works
Eastman Kodak Co.

In the March issue of SAFETY MAINTENANCE an article "Fire Tests on Film Storage" discussed safety measures to prevent nitrocellulose film fires. This material no longer is used in new motion picture film.—Editor.

Photography during the Civil War and for a considerable period of time thereafter made use of glass plates. The plates were heavy, cumbersome, easily subject to breakage. But there was obviously no fire hazard in the storage of glass plate negatives. The photographic process, however, had definite fire hazards—the wet plate process used collodion, and a more flammable mixture would be hard to imagine.

Although the Civil War was fought largely with gunpowder, smokeless powder was just coming into use and in 1866, celluloid was invented. Celluloid, of course, is a close relative of smokeless powder, both materials being composed principally of cellulose nitrate.

The first great improvement in the old glass plate process was the development of a dry emulsion which not only made it unnecessary to carry a whole darkroom into the field but eliminated the fire hazard of the volatile and explosive collodion. George Eastman, when a bank clerk in Rochester, became interested in the new emulsion and succeeded in developing processes for satisfactorily coating glass plates with emulsion and in making emulsions with dependable characteristics.

From the very beginning it was appreciated that motion picture film had the serious drawback of fire hazard, and the search began to find a material which would have the desirable qualities of cellulose nitrate but which would not possess the severe fire hazard.

Cellulose Acetate Base

Meanwhile, the search for a suitable film base had led to cellulose acetate, which is essentially cellulose, either in the form of cotton linters or wood pulp, treated with acetic acid and acetic anhydride; and in 1909 the entire motion picture production of the Eastman Kodak Company was placed on cellulose acetate safety film base.

Unfortunately, the new material did not stand up well in service and the manufacture of the cellulose nitrate base had to be resumed in 1911.

At the same time, realizing that the search would take an appreciable time, the scientists immediately undertook to develop safe methods of handling cellulose nitrate film so that it might be shown in motion picture theaters without hazard to the audience. X-ray film was coming into use and, of course, roll film for amateur use, and considerable work was done in developing standards for the safe handling of these materials.

be safe!

(Fig. 3) A number of rolls of film, nitrate and safety, alternated, are stacked in a row. The nitrate in roll form burns hotly, but safety, in roll form, will not continue to burn.

Work on these two parallel projects continued without interruption over the years that followed. Leaving the development of safety film base, it is perhaps interesting to review briefly the development of fire safety standards for the handling of cellulose nitrate film.

Much of the early work in developing safe practices in the manufacture and handling of cellulose nitrate was made in cooperation with the Factory Mutual Laboratories of the Associated Factory Mutual Fire Insurance Companies of Boston, where Frederick J. Hoxie, one of the more able early pioneers in the fire protection of unusual hazards took an active interest. A. H. Nuckolls of Underwriters' Laboratories in Chicago also did a great deal of development.

As recently as 1953, new standards for the storage and handling of cellulose nitrate motion picture film were adopted by the National Fire Prevention Association even though it was known that this material was no longer being made and would appear only in archival storage and use and in occasional showings of early films, because additional test work, both at Kodak Park and in tests conducted by the Joint Film Committee of the Federal Government at Beltsville, Md., had shown that considerable improvement in the standards could be made.

The requirements of a film base are quite exacting as the material must be satisfactory not only from a photographic point of view, but must meet rigid dimensional standards under extremes of temperature and humidity. It is interesting to note that although cellulose nitrate burns violently when ignited, right up to the ignition point it shows better heat resistance than other materials. While the early cellulose acetate would lose its plasticizer and become brittle under the intense heat of the arc lights used in motion picture projectors, the cellulose nitrate would stand up under these conditions and run through many showings without evidence of distress.

Following this first experience, experimental work order #5050 was issued in Kodak Park for the development of a satisfactory safety film base. Unlike most such experimental orders which are terminated in a year or so, work on this project continued for many years. A whole department and an able crew of technicians were built up, and thousands upon thousands of experiments were conducted. Upon completion of their assignment in 1950 this active experimental unit was reorganized and now forms the Cellulose Acetate Development Division.

During the experiments, many materials were tried. In addition to cellulose acetate, other esters such as the butyrate and propionate were tried, and combinations of esters were used in actual film bases. As other synthetic resins were developed, they also were tested.

During this period suitable bases were developed for a number of photographic products, one of the first being a satisfactory base for X-ray film. By 1926 X-ray film was being satisfactorily produced on a safety base and attempts were made to promote its general acceptance.

Acceptance of the new material was not enthusiastic in the beginning. It had a slightly different color, it had a slightly different

Some Dangerous Films Still Around

The hazards of fire and poisonous gas from illegally stored old film resulted in an order to vacate an upper West Side building, according to a story in "The New York Times" of May 26, 1956.

On May 16th firemen in a routine check found several million feet of old motion-picture film piled haphazardly from floor to ceiling in the cellar and first floor of the building. The film contains nitro cellulose which burns rapidly and emits deadly gases when burning.

At a summons hearing before the Court, Fire Commissioner Cavanagh explained that adjoining tenement buildings were endangered and that should fire occur, firemen would not be able to put it out because of the gases.

New York City's Administrative Code requires that all film be kept in fireproof vaults not exceeding 700 cubic feet.

feel to the touch, and, perhaps most important, it had a different smell. Nitrocellulose for years had been plasticized with camphor and the absence of the camphor smell made the new material unfamiliar and open to suspicion.

Safety Film Follows Tragedy

In addition, the manufacturing processes in use at that time made the new safety base much more expensive than the cellulose nitrate and it was therefore necessary to charge a slightly higher price for the material. Whatever the cause, the use of safety X-ray base was slow in developing, and it was not until the disastrous Crile Clinic explosion and fire in Cleveland in 1928 that the use of safety base for X-ray film became universal.

It is interesting to note that the storage of X-ray film in the Cleveland clinic was completely contrary to the standards of the NFPA. Had the standards been followed, the disaster would not have occurred. This experience clearly demonstrated that complete reliance cannot be placed on safe practices no matter how well developed. Failure to appreciate hazards and to follow established standards seems to be a dominant human characteristic.

The Cleveland clinic disaster, however, forced the issue and all X-ray film went onto safety base.

In other areas, progress was made. A safety base had long been available for cut sheet film used by portrait and commercial photographers. But, as in the X-ray field, acceptance of it was slow. Perhaps under the spur of the Cleveland clinic disaster, attitudes in this area began changing and after a number of years it became possible to put all production of commercial films on a safety base.

Home motion pictures using films of 16mm and 8mm width had been developed during the Twenties. From the beginning all film made in these widths has been on a safety base, and under the less rigorous conditions of home motion picture projection, has been satisfactory from the beginning.

An educational program within the motion picture industry was initiated. Many tests and demonstrations were conducted in Kodak Park for the benefit of motion picture producers. Field checks were run and questions asked to see how the film was standing up. Even the most conservative die-hard, confronted with this evidence, was convinced and by 1951 it was possible to discontinue all manufacture of cellulose nitrate film base at Kodak Park.

It must be pointed out that safety film does burn, but rather slowly, and often goes out by itself. Its burning rate has been compared with ordinary kraft paper in the same thickness and general form but actually it burns a little differently than paper. It tends to melt and generally the material, which melts and forms drops, does not burn. In burning it gives off rather acrid and ill-smelling fumes. Actually the fumes formed are a mixture of complex aldehydes and oxides and while definitely irritating and unpleasant, they are not any more hazardous than the products of combustion of most ordinary combustibles such as cotton and paper. In fact, their irritating quality serves as a warning.

Dangerous Fumes Eliminated

It should always be remembered, however, that the fumes from the old cellulose nitrate film were definitely dangerous to breathe. The burning of cellulose nitrate releases yellow to brown fumes consisting of the several oxides of nitrogen together with carbon monoxide, all of which are toxic. One of the most dangerous characteristics of nitrous fumes was that a person might be quite seriously affected and still not show any noticeable effects for from 12 to as many as 24 hours. By that time it might be too late to do anything effective to save his life.

Doctors who have had experience with nitrous fume poisoning are able to tell almost at a glance if someone has been exposed and needs treatment, but this ability comes only with long experience in the field and it is very difficult to write down any typical symptoms which can be used by the general medical profession.

Oxygen supplied under a slight resistance or back pressure in order to secure penetration deep into the lungs is the indicated treatment. It should be given routinely to anyone who has had serious exposure to nitrous fumes, whether or not there appear to be any symptoms when the patient is first brought to medical attention.

The fact that safety film does burn and does smell badly when it is burned is often confusing to many persons unfamiliar with the material. However, if anyone has ever seen cellulose nitrate film burn, there would be no question at all about the difference and the safety of the safety base film.

Relative Hazards

The accompanying pictures may give some idea of the difference in burning speed of these two materials and the relative hazard. Nitrate film unwound and piled loosely as in Figure #1 burns in a few seconds with an evolution of a tremendous amount of radiant heat while safety film burns quietly like a small heap of scrap paper or even slower as in Figure #2.

Cellulose nitrate film contains sufficient chemically combined oxygen for its own partial combustion and therefore will continue burning or decomposing intensely even if tightly enclosed, wound up in a roll or even under water. In Figure #3 several rolls of film are stacked up in a row alternating nitrate and safety rolls. Nitrate in roll form burns intensely but does not ignite the safety rolls on either side as the safety film will not continue burning in tightly rolled form. In this respect it is somewhat safer than paper as it tends to melt and stick together as a solid mass rather than unwind, as with rolled paper.

In other pictures an attempt is made to simulate a motion picture projector with upper and lower magazines (Fig. #4). It will be noted that in the case of nitrate film the material burns intensely in the magazine and shoots jets of burning gases out in all directions, while in the case of the safety film (Fig. #5) it is rather hard to see the fire at all and it goes out as soon as it enters the closed magazine.

These are small scale tests but serve to indicate the difference between the two types of material. In the case of large fires and larger scale tests the difference has become more dramatic.

(Continued on page 30)

New Fire-Resistant Hydraulic Fluid

Figure 1 shows test conducted with the new hydraulic fluid.

An economical new "snuffer" type hydraulic fluid whose fire-resistant qualities prevent it from burning on contact with flames, heated metal surfaces or molten metal, has been introduced by the Shell Oil Company, under the trade name Irus Fluid 902.

A special formulation of water, petroleum hydraulic oil and emulsifying agents, the fluid is particularly suitable for use in industries where hydraulic leaks or line ruptures would be immediate fire or explosion hazards.

Irus Fluid 902 is said to eliminate the possibility of combusion by releasing its water content as a protective steam blanket to quench fire. This "snuffer" action reduces local temperatures and displaces oxygen from the immediate area; in most cases, the remainder of the hydraulic fluid will not support its own combustion. A further advantage is that the oil will continue hydraulic action should the water be dissipated for any reason.

Despite the water in its composition the fluid possesses all of the petroleum hydraulic oil characteristics vital to proper functioning of hydraulically-operated machinery. It is non-corrosive on ferrous and most non-ferrous metals; it is compatible with normal system components; film strength provides good antiwear and antiscuff protection for closely-fitted machine parts; high shear rate viscosities assure maximum hydraulic efficiency over a wide range of temperatures. And the fluid is colored a bright yellow to permit instant recognition and location of possible leaks.

According to Shell technicians, Irus Fluid 902 replaces any conventional mineral or synthetic oil hydraulic system, and can be installed without modification of lines, pumps, valves or cylinders. Preparation of existing systems prior to installation of the fluid requires only thorough cleaning to remove previous materials. In addition, the fluid will not affect packing materials, seals or hoses, and is suitable for use in most industrial vane and gear pumps.

The fluid was subjected to a series of flammability tests under MIL-F-7100 with results that exceeded the specifications. As an example, in the pressure ignition spray test, the fluid was forced through a 0.0145-in. diameter sharp-edged orifice at 1000 psi pressure, and at temperatures to 60 to 100 degrees F. With an oxyacetylene torch adjusted for neutral flame, an attempt was made to ignite the fluid stream at distances up to 18-in. from the orifice. Under these conditions, it was impossible to ignite the fluid.

In the hot manifold test prescribed under the same specifications, a sand-blasted stainless steel tube was heated to 1300 degrees F surface temperature. Ten milliliters of the test fluid were poured steadily on the tube in not less than 40 seconds, nor more than 60 seconds. Under these conditions, there was no continuous burning of the emulsion.

Although it has unusual properties as a hydraulic fluid, Irus Fluid 902 costs up to one-third less than synthetic oils. Further information and specifications may be obtained upon inquiry to the Editors.

Figure 2 shows test conducted with an ordinary hydraulic fluid.

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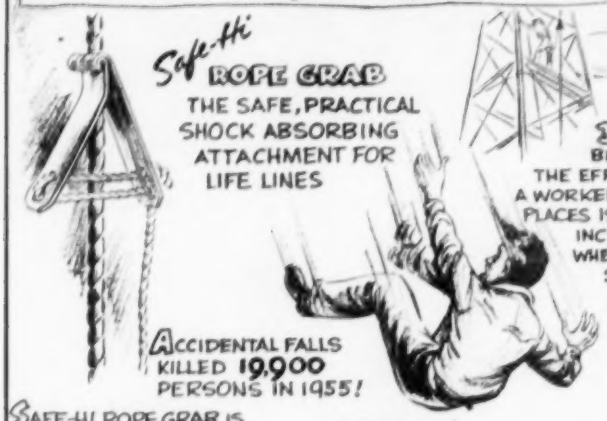

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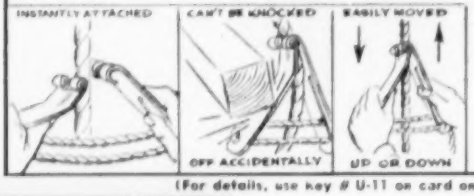
THE EFFICIENCY OF A WORKER IN HIGH PLACES IS NOTABLY INCREASED WHEN HE FEELS SECURE!

ACCIDENTAL FALLS KILLED 19,900 PERSONS IN 1955!

SAFE-HI ROPE GRAB IS EASILY SECURED, CAN BE MOVED UP OR DOWN. CANNOT BE ACCIDENTALLY DISLODGED FROM ROPE.

U.S. GOV'T DEPARTMENT OF LABOR STATISTICS SHOW ACCIDENTS INVOLVING WORKERS IN HIGH PLACES INCREASED IN 1955–ADDING MUCH TO THE APPALLING $950,000,000. COST OF INDUSTRIAL ACCIDENTS LAST YEAR!



ROSE MANUFACTURING CO.
2701 W. BARBERRY PLACE
DENVER 4, COLORADO
Safe-Hi DENVER

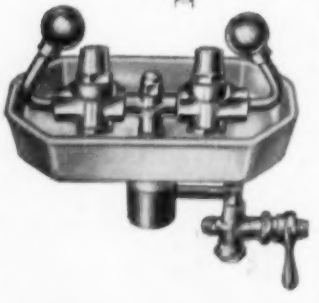
(For details, use key # U-11 on card on page 35)

THERE'S DANGER IN "TIME"

HAWS EYE-WASH FOUNTAINS

Time elapsing between the accident and arrival of medical aid, is too often a cause of permanent eye injury. Bridge this time gap with a HAWS Emergency Eye-Wash Fountain. Installed at convenient locations, these HAWS safety devices are instantaneously ready when such accidents occur.

The HAWS Eye-Wash Fountain washes injurious chemicals out of the eyes with clean water at controlled pressure and volume. It is also available with Drench Shower Attachment... completing an emergency station for your employees' protection.



Designed and manufactured in cooperation with leading safety engineers

WRITE TODAY for brochure and full details

HAWS DRINKING FAUCET CO.
1439 FOURTH STREET (Since 1909) BERKELEY 10, CALIF.

(For details, use Key # U-12 on card on page 35)

Safety Film

(from page 28)

Safety film is listed by Underwriters' Laboratories as having approximately the same burning rate as an equivalent amount of ordinary paper and requires about the same degree of fire protection. Large quantities stored in warehouses need sprinkler protection of the same type which would be provided for a similar amount of paper records or similar materials.

Danger Being Reduced

While cellulose nitrate film has not been manufactured in this country for the last five years, it is always possible that an occasional roll of foreign film may appear. Ordinarily foreign films shown in the United States arrive in the form of negatives or master prints from which duplicates are made on safety film so that the original does not appear in a theater.

When we can be reasonably sure that the last roll of nitrate which can possibly be shown in a regular motion picture theater has been destroyed, it will be possible to relax control almost completely. In the meantime, vigilance is needed to make sure that cellulose nitrate film does not get shown or stored under conditions suitable for safety film. It should be kept in mind that an occasional single roll finding its way into a general storage of safety film would not create an undue hazard in that it would not set fire to the remaining materials. Handling of junk film, that is, scrap nitrate film of no more commercial value, will present a problem until all of it is destroyed.

The net result of these many experiments and developments has been the elimination of a serious fire hazard. In addition to this, there is, of course, a considerable economic gain in handling this material; costly vaults and elaborate deluge systems are not needed. Motion picture film can be stored, handled and transported as an ordinary commodity.

Pictures by courtesy of Eastman Kodak Co.

The Paradox of Thunderstorms

Two hundred and four years ago Benjamin Franklin discovered the theory of lightning. His famous Sentry Box Experiment in which he produced static sparks from an erected iron rod has come down to us as an adventure in science which has finally developed into an international industry. Franklin paved the way. Although not an engineer, he carried on a great deal of correspondence with early scientists, physicists, and learned men in England and on the continent of Europe. Many men were seriously hurt or killed trying variations of his first crude findings. However, the spark that was Franklin in science, statesmanship and ventures in other fields glowed for many years and at times all but burned out after his death. For almost a century and a half in the field of lightning protection men groped for ways and means to protect themselves. It was not until early in the present century when losses from lightning became so great that men of science and vision once more turned to the theories of Franklin and took up where he left off.

Pioneering men like West Dodd, thought by many to be the father of our present lightning rod industry, developed the copper lightning rod so that its use began to make a dent in the huge losses of life and property. Dodd introduced the so-called static machine for demonstration of lightning rod efficiency to potential customers.

Others Enter Field

Others entered the field of manufacture. In fact, at one time there were probably twenty times as many manufacturers as there are today. It became a free for all to exploit, to sell, to promote. Rascals descending upon the gullible public, realizing they were dealing in something beyond the knowledge of the average man, preyed upon the unsuspecting.

The day of reckoning was on the way. Buildings with poorly installed inferior equipment were struck and burned flat often within days after the work was done. Occupants within buildings were rudely shocked and even killed with the supposedly life-saving lightning rods over their heads. The fast working, sometimes actually thieving horde who traveled far and wide, leaving a train of notes given in payment upon which they had forged higher face values, folded their tents and moved on and on until the law or the lack of suckers caught up with them.

Insurance companies scratched their heads. They had been led to believe that here might be the answer to their fast rising lightning losses and yet it presented such a mixture of good and bad they dared not recommend the protection for fear it might backfire in another loss from the very menace they were trying to defeat. This was the situation as late as the 1920's. It looked as though the work of Franklin was lost forever.

There were at this time few manufacturers left in the business. A hard core of determined men felt that all was not lost, that the shady element could be cleaned out of the business, and that somehow, somewhere, the principle of good lightning rod installations would vindicate their faith in Franklin's work—possibly by standardization of equipment, procedures, training of new installers, and with some regulation by a non-partisan body.

Order from Chaos

It is generally recognized that the Underwriters Laboratories and their field organization put lightning rods back into high gear. Their testing laboratory, their wide knowledge of electrical science, the hazards involved and their ability to subject equipment to test from an electrical and mechanical standpoint has brought order from the former chaos. The opportunity their field force has to gather data

(Continued on the next page)

and to supervise and inspect systems after erection, resulted in the public's acceptance of lightning rods as a 99 percent plus factor in protecting life and property.

Thanks to the supervision of this organization, today you may receive a call of a lightning rod installer with complete confidence. If he sells and installs equipment passed by the Underwriters Laboratories, you may rest assured it will be installed in a manner approved by them, or it will be criticized by their field inspector whose word is law in the lightning rod industry.

Less than 20 manufacturers subscribe to the Underwriters code for the manufacture and installation of master label lightning rods. These producers of equipment make first class lightning rods—or else! They are called upon by field inspectors without notice and must produce standard equipment for comparison with original units submitted. The field inspector travels the country over checking a certain percentage of each dealer's installations. Where or when he will appear no one knows. This is lightning protection at its best.

What a nation of paradoxes we are. We feel and we know we are traveling fast, scientifically and mechanically. Yet it took two hundred years for an invention of Benjamin Franklin's to ring the bell. Until we know we can be protected from thunderstorms, we hope it will rain but we won't get struck. We like to feel we know a good thing when we see it, yet we somehow doubt the truth of statements which cannot be backed up by real evidence. We should be thankful for the experience back of the modern lightning protection system. It took a long while to get it there. It has now proved its worth.

Interesting booklets on this subject are available from the United Lightning Protection Association, 404 Jefferson Bldg., Syracuse, New York.

For Safety
Guardi-Ann Hat

Combines utmost protection and style. Exclusive patented features found in no other hat.

Write for Free Sample or Order Direct from us

$15.00 dz.

CHIC MAID HAT MFG. CO., Inc.
630 HIGH STREET
BUFFALO 11, N. Y.

(Use Key # U-13 on Inquiry Card on page 35)

Fire Training

The industrial safety program in effect at the Whittier, Calif., Research Laboratories of American Potash & Chemical Corporation was augmented recently to include a course in emergency fire fighting.

Purpose of the course was to acquaint research employees with methods of fighting fires and proper handling of auxiliary equipment, such as gas masks, until the arrival of professional fire-fighting crews.

The course is an example of the stepped-up safety program not only of American Potash & Chemical Corporation but of industry in general to lower accident rates during working hours.

The fire-fighting forum at the research laboratory was arranged by the lab's safety committee in cooperation with the Whittier Fire Department, under the direction of Chief A. B. Alford.

Whittier Assistant Fire Chief C. W. Stephenson conducted lectures and demonstrations, including question-and-answer sessions. Following this, each of the lab's technical personnel put out a controlled gasoline-and-oil fire with a dry chemical fire extinguisher.

Employees also were instructed by Capt. C. O. Johnson on the proper method of donning and adjusting two types of gas masks for varying emergencies.

Additional sessions were planned in fire drills and other aspects of fire-prevention and fire-fighting to add to the lab's safety program, which includes frequent inspections by division heads and unannounced checks by lab personnel.

Instrument Conference

The Instrument Society of America has announced plans for its 11th Annual Instrument-Automation Conference and Exhibit (International). The 1956 Conference and Exhibit will be held at the new Coliseum building in New York City. The dates are September 17–21, 1956.

It is anticipated that this 1956 program will be by far the largest and most far-reaching ever sponsored by the Society. A large number of requests for space have already been forwarded to Exhibit Manager, Fred J. Tabery, 3443 So. Hill Street, Los Angeles 7, California, including many from European countries. The east coast location is expected to attract many firms from the continent where there is a rapidly increasing activity in the field of automation.

Safety Congress

The 44th National Safety Congress and Exposition will be held Oct. 22–26 in Chicago, Ill. Sessions on industrial safety are scheduled for the Conrad Hilton, Congress, Morrison and La Salle hotels; traffic safety sessions at Congress hotel; commercial vehicle and transit safety sessions at La Salle hotel; farm and school sessions at Morrison hotel, and home safety sessions at Conrad Hilton hotel. For further information write R. L. Forney, secretary, National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

SEND THIS PERSONAL SAFETY MESSAGE

TO EVERY ONE OF YOUR EMPLOYEES!

Safety is made attractive...vivid...colorful...

each worker clearly sees how safety benefits him.

You get enthusiastic safety cooperation instead of

tolerance...from every employee...every month.

YOUR
Safety News
PUBLISHED IN THE INTEREST OF YOUR SAFETY
THE JOHN DOE COMPANY, INC.
PROTECT YOURSELF
3
WAYS
There are three safe practice ways that do the most good in keeping free of accidents, all based on your personal desire to know safety and keep yourself safety-minded by studying the hazards of your work. They are
1 Make sure all guards are in place and working and wear the personal protective equipment your job requires.
2 Learn the safe way to do a job and do it just that way.
3 Report, avoid or eliminate all unsafe conditions.
As we see it: Safety is part of every job and like any craft is requires skill.
John Doe

Size 5½" wide x 8½" deep

...talks the worker's language!

Full of color, pictures, humor and snap, it makes safety interesting and down-to-earth. 12 times a year it covers every accident hazard. Nationwide, leading industrial firms state it's the *only safety paper their employees will read* . . . and take home to their families.

It gives you the advantages of personal contact, saving time and money. When it prevents one Lost Time accident, it has more than paid its cost for the year. Try it...it works!

Your Imprint Here!

makes YOUR SAFETY NEWS your own publication . . . a good-will ambassador . . . another force for better industrial relations.

Every employee feels bucked-up by a note from the boss. If you desire, your facsimile signature can be printed here.

Your Signature Here

NOTE:
Your Safety News is designed to promote better employer-employee relations. Every item is carefully weighed from this viewpoint.

INSIDE PAGES
(pages 2 and 3)

IN YOUR EMPLOYEE'S INTEREST

Your employee's self interest in his own safety is always emphasized. Even household hazards are covered to keep him safety-conscious every minute, not only in the plant, but at home and on the way to work.

CHOCK-FULL OF ILLUSTRATIONS

Artwork is carefully chosen to lodge home each point. The cartoon style makes YOUR SAFETY NEWS as familiar and as welcome as the Sunday supplement.

THE "FOLKSY" APPROACH

Keeping the contents folksy, adding the grace note of humor, delivers your safety message with a nudge instead of a bludgeon. Your monthly shot gets enthusiasm instead of tolerance.

VIVID COLOR

Generous use of color gives sparkle, adds to the attention-riveting qualities of YOUR SAFETY NEWS. Each issue is as lively as any news-stand favorite.

HOW TO ORDER

YOUR SAFETY NEWS may be ordered with either the Standard imprint or with your Own Special Imprint. The Standard Imprint reads PLEASE COOPERATE FOR THE SAFETY AND HEALTH OF ALL . . . signed . . . A SAFE WORKER.

You can personalize YOUR SAFETY NEWS with the name of your firm and the name or facsimile signature of a company representative as illustrated. Give full instructions for your Special Imprint on the order blank below.

Item (1) FIRM NAME. Please show the name of your firm exactly as it is to appear.

Item (2) INDIVIDUAL NAME OR SIGNATURE, if desired. On a sheet of white paper, please show, in black ink, the individual name or signature, if desired, which is to appear each month on the first page of YOUR SAFETY NEWS.

NOTE: Although a personal signature is effective, some firms substitute: SAFETY DEPARTMENT, YOUR SAFETY COMMITTEE, A SAFE WORKER, etc.

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200 to 500 copies	5½¢ each	4½¢ each
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25 to 99 copies	*	5½¢ each

* 6½¢ each plus $3.50 per month. For Special Imprint. F.O.B. New York, N. Y.

FREE BULLETINS & CATALOGS

As a convenience to executives, these new publications of manufacturers are offered by the Reader Service Department of SAFETY MAINTENANCE & PRODUCTION. To obtain copies write in the key numbers on the free-postage card below.

EQUIPMENT MAINTENANCE

Tachometers 611
Herman H. Sticht Co., Inc. Tachometers to cover most speed ranges, as low as 1 RPM and as high as 100,000 RPM are featured in this illustrated brochure. Specifications are given for the various models which include centrifugal, chronometric, vibrating reed, portable and stationary, single and multiple range types.

Rotameters 612
Brooks Rotameter Co. Featured in this fully illustrated catalog is a line of rotameters for the measurement and control of liquids and gasses. Highly informative, the catalog provides information on specifications, performance, principles of operation, uses, etc.

Tank Cleanout Valve 613
Liquidopth Indicators, Inc. 6-page bulletin describes a safety cleanout valve for use on buried tank installations for storage of volatile, flammable liquids. The valves provide safe, easy access to tank bottoms for the removal of water and sludge. Construction and operation features are detailed.

HYGIENE

Industrial Hand Preparations ... 614
John H. Breck, Inc. A line of hand cleaners and protective creams are described in this illustrated bulletin. The preparations are designed chiefly for industrial use, in the prevention of lost man hours due to dermatitis.

Stretchers 615
Washington Products Co. A 58-page illustrated catalog offering a complete line of stretchers. Information includes specifications and prices, and explains the features of the various models available.

First Aid Kits 616
E. D. Bullard Co. Illustrated 6-page catalog covers a series of first aid kits and supplies including more than 100 unit packs and special kits such as ammonia kits and burn spray kits. Photographs and descriptions simplify ordering of the materials.

Emergency Showers 617
Speakman Co. The importance of emergency showers where there is bodily danger of injury from chemicals, acids or flammable materials is shown in this illustrated brochure. The various models available, specifications for each, and their application, are also described.

Sludge Reducing Bacteria 618
FX-Lab Co. An illustrated brochure on the results of field tests involving the use of newly developed bacteriological cultures as a sludge reduction aid for municipal treatment plants. Assembled data covers a five-month controlled test and a six-month comparison test.

MAIL POSTAGE PAID CARD FOR MORE DATA

SIGNS & AWARDS

How Not To Be A "Sitting Duck" 619
Veri-Products Co. Reflective-type warning flares as protection for vehicles forced to stop on highways are featured in this colored bulletin. The flares come equipped with day-use warning flags, and are designed to prevent "sitting duck" accidents.

Self-Sticking Markers 620
W. H. Brady Co. Informative bulletin describes the many uses for adhesive-backed letters and numbers. The durable, vinyl cloth markers are available in several sizes and can be used to identify storage shelves, parts bins, file cabinets, pallets, etc.

Emblems & Awards 621
Williams Jewelry & Mfg. Co. Many types of emblems and awards, such as plaques, trophies, badges and personal gifts, are illustrated in this 35-page catalog. The awards, designed to stimulate employee interest in company safety programs, etc., are tangible evidence of management's recognition and appreciation.

FIRE PROTECTION

Interior Fire Fighting Equipment 622
Seco Engineering & Mfg., Inc. This 8-page booklet features a line of interior fire fighting equipment such as hoses, nozzles, valves, hose cabinets, standpipe connections, etc. Fully detailed information includes specifications and recommendations for the various items listed.

Fire Alarm System Guide 623
Edwards Co., Inc. Highly informative booklet designed to assist those who prepare specifications and requirements for fire alarm systems operated under the control of the owner of the property to be protected. Also included is an interpretation of the National Fire Protection Association codes, and information concerning the basic types of fire alarm systems available.

The Handling of Flammable Liquids 624
The Protectoseal Co. Illustrated bulletin explains the characteristics, hazards, and methods to safely handle flammable liquids. Safety devices such as flame arresters and automatic closing devices for flammable liquid containers are discussed, along with the need for pressure relief and vacuum relief.

(Continued next page)

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PLEASE PRINT

Name _____ Title _____

Company Name _____

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City _____ Zone _____ State _____

August, 1956 Please send me the following free data

Free Bulletins (Cont'd)

ATMOSPHERE CONTROL

Smoke Density Indicator System 625
Electronics Corp. of America, Combustion Control Div. Illustrated with photos and drawings, details of a smoke density indicator system are given in this 4-page brochure. Complete operating and specification data is included, as well as installation information.

Dust Collector 626
Pangborn Corp. A dust collector utilizing the venturi tube principle is illustrated and described in this 8-page booklet. Dimensions, weights, and capacities of the various models available are furnished in easy-to-use reference tables.

PERSONAL PROTECTION

Respirators 627
H. S. Cover. Informative bulletin describes a line of respirators for use against various gases and vapors, giving their application and specifications. Respirators are illustrated and include types that mask the nose, nose and mouth, and the nose, mouth and eyes.

Acid Resistant Work Clothes 628
Chem-Wear, Inc. Dynel-cotton weave work clothes, combining the comfort of cotton cloth with the durability of dynel, are featured in this illustrated brochure. The acid and caustic resistant clothes are available as shirts, trousers and coveralls.

Safety Spectacles 629
Willson Products Div., Ray-O-Vac Co. A dozen styles of safety spectacles are illustrated and described in this colored brochure. Recommended applications and variations for each of the styles are given.

BUILDING MATERIALS

Abrasive Floor Plates 630
Alan Wood Steel Co. Featured in this illustrated booklet is a line of abrasive rolled steel floor plates. Information includes fabricating data, applications, and allowable uniform load tables.

What's YOUR Problem?

- **Has an accident or fire interrupted production?**
- **Want to know how to prevent it?**
- **Do you need background information on equipment for industrial safety, hygiene, or maintenance?**

As a service to its readers, "Safety Maintenance" will arrange to supply manufacturers literature on the following subjects. Just insert the key number on the Readers Inquiry Card on the preceding page and be sure to fill in your name and address. If you need information on a specific type of product, simply write it in on the Inquiry Card.

Key Number	Subject
	PERSONAL PROTECTION
101	Safety Goggles
102	Face Shields
103	Lens Cleaning & Anti-Fogging Equipment
104	Sweat Band
105	Hard Hats
106	Respirators & Masks
107	Protective Clothing
108	Women's Protective Clothing
109	Safety Belts
110	Safety Gloves
111	Foot Protection
112	Anti-Slip Soles
113	Oil-Proof Soles
114	Welding Helmets
115	Welding Curtains
	FIRST AID AND PERSONAL HYGIENE
120	Protective Skin Cream
121	Skin Cleansers
122	Sanitary Drinking Facilities
123	Athlete's Foot Control
124	Salt Tablets
125	Noise Analysis & Control
126	Antiseptic Medication
127	Burn Medication
128	First Aid Kits & Supplies
129	Stretchers & Litters
130	Resuscitators
131	Eye Wash Fountains
	DUST & FUME CONTROL
137	Carbon Monoxide Control
	FIRE PROTECTION
141	Safety Cans
143	Safer Solvents
144	Degreasing Machines
146	Fire Blankets
148	Watchmen's Control Systems
149	Fire Resistant Hydraulic Fluids
	LIGHTING EQUIPMENT
150	Alarms & Warning Lights
151	Explosion-Proof Lights
152	Electrical Insulation Tester
153	Fluorescent Lamp Guards
154	Emergency Lights
	MAINTENANCE
160	Anti-Slip Floor & Mats
161	Anti-Slip Waxes & Finishes
162	Floor Cleaning Compounds
163	Cleaning Machines
164	Oil & Grease Absorbents
165	Paints
167	Concrete Finishing & Cutting Machines
166	Floor Resurfacing Materials
169	Lubricants
	LADDERS & HANDLING
170	Ladders & Safety Devices
171	Scaffolds
172	Work Platforms
173	Slings
	GUARDS
175	Machine Guards
176	Power Press Feeders
	EDUCATIONAL AIDS
180	Safety Signs
181	Aisle Marking Equipment
182	Safety Awards & Emblems
183	Employee Safety Guide
184	Safety Tools
185	Work Tables

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WHAT'S YOUR PROBLEM?

Safety Maintenance SALUTES

A SAFETY IDEA

Cap Safety Liner

Consolidated Edison Company meter readers will have effective protection against accidental head bumps thanks to a practical, lightweight plastic uniform cap liner developed by two Con Edison safety men.

The device, which has been appropriately named the "Nesmo Hat Liner" after the names of the two men who developed it, is the result of intensive research into this field by Robert Nesbit, safety lecturer, and Richard Molen, safety inspector, both of Con Edison's Safety Bureau.

The Nesmo Hat Liner was designed to be used by uniformed personnel like meter readers whose work may take them into basement corners where overhead obstacles such as exposed piping sometimes exist.

The liner comprises a shaped crown designed to fit inside any standard uniform cap. The crown is held in place inside the cap by an attached plastic anchor strap which tucks in behind the sweatband. This also provides a degree of frontal protection. A foam rubber pad centered in the underside of the crown cushions against any sudden impact with an overhead object.

This liner can be used with the type of uniform caps generally worn by utility meter readers, chauffeurs or uniformed delivery personnel. It was displayed at the Gimmicks and Gadgets section of the Greater New York Safety Convention and Exposition, where it provoked considerable interest by participating industry groups.

A patent applied for the liner by Nesbit and Molen is assigned to Con Edison. The device already is being manufactured commercially for Con Edison and a number of liner-equipped uniform caps issued on trial have proved successful and popular. As designed, the liner can be incorporated into the uniform cap at the time of manufacture, or it can be inserted separately in any cap. Thus use of the device does not require the replacement of existing uniform cap stocks.

the future shows

York Harbor, Me. *September 13–14*

Twenty-Ninth Annual Maine State Safety Conference (Marshall House). Arthur F. Minchin, Secretary, Department of Labor & Industry, State House, Augusta, Me.

New York, N. Y. *October 14–16*

First International Sanitation Maintenance Show & Conference (New York Coliseum). William S. Orkin, managing director, Orkin Exposition Management, 19 W. 44th St., New York, N. Y.

Chicago, Ill. *October 22–26*

Forty-Fourth National Safety Congress and Exposition (Conrad Hilton Hotel). R. L. Forney, Secretary, National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

Columbia, S. C. *November 8–9*

Nineteenth Annual South Carolina Accident-Prevention Conference (Jefferson Hotel). J. D. Watson, Jr., Safety Engineer, South Carolina Industrial Commission, Columbia, S. C.

Atlantic City, N. J. *November 12–16*

Eighty-Fourth Annual Meeting of the American Public Health Association (Convention Hall). Information: American Public Health Association, 1790 Broadway, New York, N. Y.

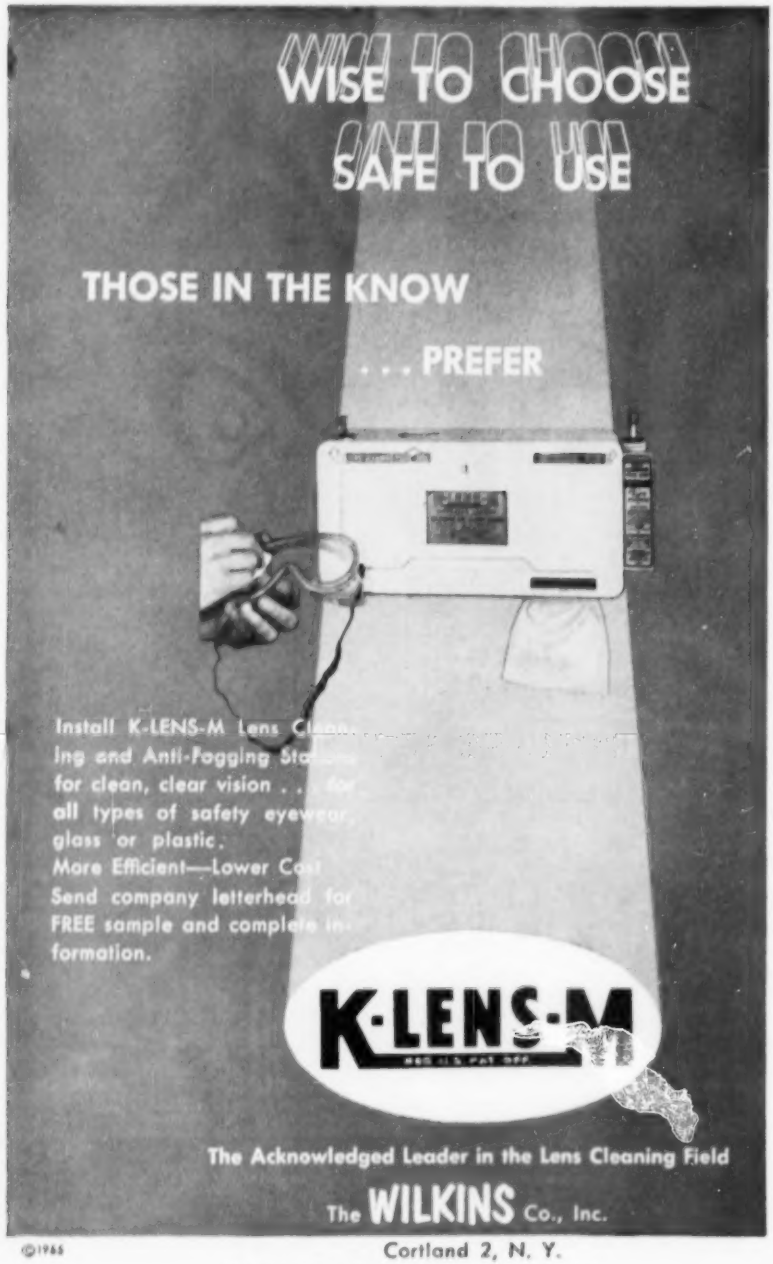
Fort Wayne, Ind. *March 19–20*

Fourteenth Annual Northeastern Indiana Safety Conference and Exposition (Chamber of Commerce Building). Ivan A. Martin, manager, Safety Council, Ft. Wayne Chamber of Commerce, Ft. Wayne 2, Ind.

Accidents Up in '55's Fourth Quarter

The injury-frequency rate for manufacturing averaged 11.7 disabling injuries per million man-hours worked during the fourth quarter of 1955, 4 percent higher than in the similar period of 1954, according to preliminary reports compiled by the U. S. Department of Labor's Bureau of Labor Statistics.

Despite lower rates in 5 months out of the year, the preliminary 1955 average was slightly above that for 1954—12.1 compared with 11.9. From the alltime low of 10.5 in December 1954, the monthly rates moved steadily upward to a peak of 13.9 in August of 1955. A substantial drop to 12.0 in September was offset by an increase to 12.5 in October. Declines to 11.6 in November and 10.9 in December 1955 followed the usual seasonal pattern, but these rates were still above 1954.


WISE TO CHOOSE
SAFE TO USE
THOSE IN THE KNOW
. . . PREFER
Install K-LENS-M Lens Cleaning and Anti-Fogging Stations for clean, clear vision . . . for all types of safety eyewear, glass or plastic.
More Efficient—Lower Cost
Send company letterhead for FREE sample and complete information.
K-LENS-M
The Acknowledged Leader in the Lens Cleaning Field
The WILKINS Co., Inc.
Cortland 2, N. Y.
©1955
(For details, use Key # U-14 on card on page 35)

The fourth quarter rates and annual averages for most individual industries were somewhat higher in 1955 than in 1954, despite modest seasonal decreases between the third and fourth quarters. Of the 133 separate industries for which comparable quarterly rates were available, 64 showed decreases of 1 full frequency rate point or more between the third and fourth quarters, while 53 showed little change, and only 16 recorded increases of 1 full point. Over the year's period, however, the fourth quarter rates of only 22 industries showed significant decreases between 1954 and 1955, but those for 64 recorded increases of 1 full point or more, and 47 showed little change. Annual averages for 69 of the 135 industries for which full-year rates were available showed little change between 1954 and 1955, but 48 showed increases of 1 full point or more, while only 18 recorded decreases of this much.

Biggest Decrease

The largest decrease between the third and fourth quarter of 1955 occurred in logging, where the average dropped from 86.2 to 75.9. This fourth-quarter rate, however, was well above the 69.6 recorded for the same period in 1954, and the annual average increased slightly, from 74.3 in 1954 to 75.4 in 1955. Other industries recording outstanding decreases between the third and fourth quarters of 1955 were: Sawmills and planing mills; bottled soft drinks; structural steel and ornamental metal work; leather tanning and finishing; office furniture; sausages and other prepared meat products; the concrete, gypsum, and mineral wool industry; and structural clay products. However, the annual averages for 3 of these industries showed increases over 1954, 1 showed no change, while the remaining 4 recorded only moderate improvement.

The Increasing Rates

Substantial increases in the annual averages also were shown for 3 more industries. The average for poultry and small game dressing and packing increased from 32.0 in

1954 to 38.7 in 1955; cold-finished steel, from 11.6 to 17.7; cutlery and edge tools, from 13.6 to 18.8.

Rates in 15 industries were less than 5.0 during 1955. The most outstanding records were: synthetic rubber—1.6; synthetic fibers—2.3; miscellaneous communication equipment—2.3; aircraft—2.7; radio tubes—2.8; electric lamps (bulbs)—3.2; explosives—3.3; tires and inner tubes—3.5; miscellaneous industrial organic chemicals—3.9.

Radioactive Materials

(from page 13)

cannot be condoned because they lead to a breakdown of safety procedures. Continued violations can lead to serious long-term results.

Whether or not an operation involving radioactive materials is safe depends on the employee himself.

Single copies of the "Instructor's Handbook" and the "Radiation Safety primer" are available from the Safety and Fire Protection Branch, U. S. Atomic Energy Commission, Washington 25, D.C.

Quantity copies of the "Radiation Safety Primer" can be ordered from the Superintendent of Documents, Washington 25, D.C. at 25¢ each, with 25 percent discount for orders of 100 or more.

Sets of the colored slides are available commercially. Inquiries should be addressed to Safety and Fire Protection Branch, U. S. Atomic Energy Commission, Washington 25, D. C.

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NFPA Meeting

(from page 25)

leaks probably would be found in piping.

He said, "Of all underground tanks now in service, I feel confident that at least 10 percent are leaking."

Studies indicate two causes, he said: corrosion due to soil or similar chemical conditions, and leakage caused by human failure to install or maintain tanks and piping properly.

But, he declared, "the second and larger human failure" is "the failure of responsible people to face up to the problem where a leak or spill has caused loss of life or property damage."

"They will tell you time and again that they have NO leaks or loss of product, only to sheepishly admit, when confronted with the facts, they were losing 10 gallons a day but didn't think that small amount could make any difference."

Scott declared "any unaccounted-for loss from any tank or pipes is important . . . knowing that this leakage is going on every day, and knowing from our investigations it is getting into sewers and buildings and causing explosions and loss of life and property, it behooves us in the enforcement field, to do something positive about finding the source of these leaks and eliminating them."

B R E C K

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BRECK pH7 PROTECTIVE CREAM protects the hands against irritants such as lubricating oils, cutting compounds, tar, greases, rubber dust, aromatic and hydrocarbon solvents, fiberglass, paint and iron dust. It forms a non-sticky, invisible film over the skin. Breck pH7 Protective Cream is easily applied. It is easily removed with Breck Hand Cleaner or soap and water.

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industrial hygiene

Industry Should Lead in Public Sanitation

One American in four has no community health protection, according to Leo J. Kelly, speaking on behalf of the National Sanitary Supply Association, an organization of sanitation consultants.

"About half the counties in the country do not have full time health departments," Kelly pointed out, adding, "moreover, most health departments are overworked and woefully shorthanded. They need more workers—physicians, nurses, sanitarians, clerks, etc., to bring them up to even minimum standards.

"Because of these and other limitations, the only possible way various laws, regulations and ordinances that safeguard the public can be fully enforced is through the cooperation of the public at large," he indicated. "The public must be given an aroused self interest in public health matters and cleanliness programs of every kind. Our great need in the public health and environmental sanitation fields today is to develop greater public acceptance and recognition of the work of public health officials, sanitarians and sanitation consultants.

"Industry led the way in safety measures. Today we have safe places to work and importance of safety is generally recognized. But today management gives a great deal more attention to accidents in their plants than to sanitation which also plays an important part in better living, progress and our American way of life. Perhaps industry can now lead the way in showing us how to dramatize our public health needs so that the situation will receive the public attention and support deserved," Kelly concluded.

Need for Smog Instrument

What's needed now—by smog researchers trying to track down oxidants in the atmosphere which may play a role in eye irritation—is an oxidant recorder with an educated nostril which will not be confused by ozone. Need for such a new instrument is established in a four-months study conducted jointly by scientists of the independent Air Pollution Foundation and the Los Angeles County Air Pollution Control District.

Using one instrument which measures nothing but ozone, while simultaneously using others which measure the total concentration of all oxidants, the scientists determined that ozone comprised on the average 70 percent of the peak oxidant measured on a smoggy day.

But ozone does not in itself cause eye irritation, and of the remaining 30 percent of oxidants, only six percent was identified as nitrogen dioxide.

Therefore, the scientists conclude, some way must be found to sort out and pinpoint the unidentified balance of 24 percent, which is believed to be chiefly organic peroxides. Dr. A. J. Haagen-Smit, professor of bio-organic chemistry at Caltech, has previously measured as much as 40 parts per hundred million of this class of materials in the atmosphere on a smoggy day.

The oxidant-ozone study was conducted in Pasadena during the July–November "smog season" last year by Dr. N. A. Renzetti, Foundation physicist, and J. C. Romanovsky, Control District chemist.

Two widely used instruments for oxidant measurement—a phenolphthalein oxidant apparatus and a potassium iodide continuous oxidant recorder—were used in the tests, together with a rubber cracking ozone apparatus and the ozone radiometer developed by the Foundation last spring.

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Figure 1 Ear-Protective Devices Used by Personnel Working in High Noise Level Areas.

Noise Control in Industry

Editorial Note: This is the third of three articles on noise control in industry. Earlier articles were devoted to the effects of noise on human behavior and the development of criteria for acceptable noise levels in terms of speech communication, annoyance, and hearing preservation. The present article describes the nature of noise control treatments and gives examples of specific acoustic treatments for some typical industrial noise problems.

by **LAYMON N. MILLER**
Bolt Beranek and Newman Inc.
Consultants in Acoustics
Cambridge, Massachusetts

In its barest essentials, noise is produced by a noise-making device, it is then transmitted from the device by means of air or structure paths, and it is ultimately heard by a receiver. This sequence of noise generation, transmission and reception provides the clue for steps toward noise reduction or noise control.

It is usually preferable to try to reduce the noise at its source before it has a chance to spread out to

Figure 2 Acoustic Absorption Material on Ceiling Reduces Transmission of "Reverberant Sound."

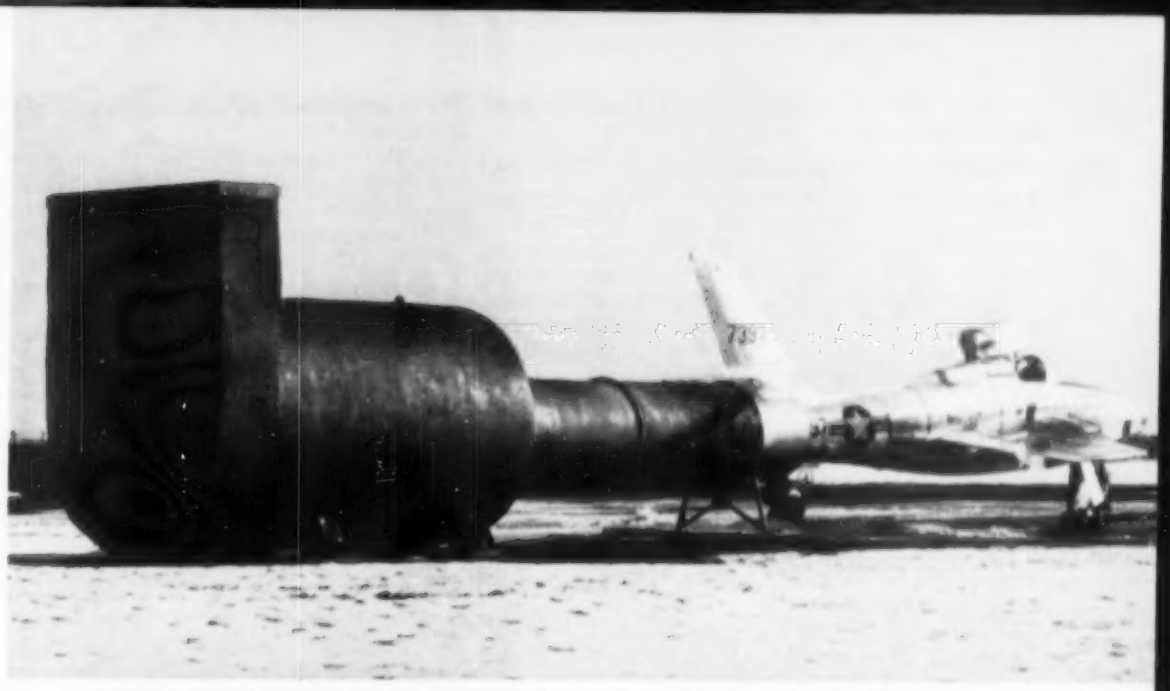

Figure 3 Jet Engine Muffler Provides "Noise Control at the Source" for Ground Run-up Operation.

surrounding areas. When this approach is impractical, the next approach is to try to reduce the transmission of noise from the source to the receiver. The last approach is to try to provide suitable noise control at the receiver. One or more of these approaches is certain to be involved in every noise control problem.

In a broad sense there are possibly four general types of noise control which can be applied to a noise problem. These four noise control measures are: (1) use of vibration isolation methods, (2) use of enclosures or barriers, (3) use of mufflers or sound absorption devices in open passages, and (4) suitable location of noise sources in the surroundings. To exemplify these general measures, secretaries place their typewriters on felt pads, ship-workers wear ear plugs, automobiles and trucks have sound-attenuating mufflers, offices have acoustic tile on the ceiling and air fields are located many miles from population centers.

Let us investigate some of these noise control measures and see how they may be applied to noise control at the source, along the noise paths, and at the receiver.

Noise Control at the Source: It is, of course, highly desirable to design and engineer most mechanical devices to be relatively quiet in operation. This generally gives greater public acceptance and sales appeal to an article. There are a number of devices, however, which by the very nature of their operation cannot be designed to operate quietly without interfering with their performance. For example, even the best gears make noise as power is transmitted from one to the other, an airplane propeller must make noise if the airplane is to fly, a riveting hammer must make noise to do its job, even the keys of a typewriter must make noise in order to give a sharp, clear page of type. And, of course, the automobile horn and the telephone bell are intentionally designed to be noisy—in a pleasant way.

There are many other devices, however, which are neither intentionally noisy nor of necessity noisy. Almost all of this category of noise sources can benefit in some sense from noise reduction at the source. Where possible this noise reduction is designed into the device, but in many instances the device is already designed, manufactured, sold and in operation and it is too late to consider basic design. Although we frequently work with designers and manufacturers on product development at the design stage, we more frequently work with clients who already have purchased and are operating noisy devices. Thus, with these clients we arrive at modifications or additions to the original devices in order to control their noise output. As suggested earlier, vibration isolation, barriers or enclosures, mufflers or sound absorption devices, and location are the general measures applicable to noise control at the source.

Noise Control Along the Noise Paths: Once the noise is produced it radiates somewhat in all directions and by all available paths. Frequently, a noisemaker radiates more noise in one direction than it does in another; or it may radiate more noise of one frequency band in one direction and more noise of another frequency band in another direction. In complicated devices the "radiation pattern" may be quite complex and this may have to be considered in the design of adequate noise control.

The transmission paths of sound are usually air paths and structure paths (and combinations of both). In a balanced noise control, both types of paths must be considered, and the treatments must be designed to supplement each other. For structure-borne noise, vibration isolation is the principal control measure. For air-borne noise, barriers or enclosures, mufflers

or sound absorption devices, and location are the general control measures.

Noise Control at the Receiver: If it is impossible or impractical to reduce the noise before it gets to the receiver, then the last approach is to protect the receiver. The receiver may be the operator of a riveting hammer, or it may be the pilot or passenger in an airplane, or it may be a delicate instrument sensitive to noise or vibration, or it may be a person making a telephone call from a subway station. The general measures named above are also available for noise control at the receiver. For the operator of the riveting hammer, ear plugs or a noise helmet may be the control measure. For the airplane pilot and passenger much of the cabin structure is designed specifically as a noise-reducing enclosure. For the delicate instrument, possibly location and vibration isolation are control measures. For the telephone call, a new type of telephone booth is both a partial enclosure and a sound absorption device.

Let us illustrate, with specific examples, the application of these various control measures to noise problems at the source, along the paths, and at the receiver.

Vibration Isolation

An air compressor manufacturer produces a particular air compressor for general use in automobile service stations, garages, and paint shops. It was determined from noise and vibration measurements that much of the noise radiated by the compressor assembly was actually generated by the small reciprocating compressor unit and was transmitted through welded brackets to the large air storage tank and then radiated. In the development of a new model compressor, the welded brackets are being removed and rubber-in-shear type vibration isolation mounts are to be used. This, along with other improvements, is expected to provide a significantly lower noise output for the new compressor.

During the past several months we have been requested a number of times to assist in the design of noise control treatments for executive-type offices located immediately under an entire air-conditioning mechanical system of a large building—such as in Case I of last month's article. This type of problem involves both (1) vibration isolation against structure-borne noise and vibration and (2) barriers against air-borne noise. For such problems, properly selected vibration isolation mounts must be used with the blowers, pumps, motors, compressors and other auxiliary machinery, but these alone are not enough. Many of the noise and vibration problems are so severe that the concrete floor supporting the vibration isolation mounts must itself be isolated from a second floor beneath it. This isolation may be achieved by "floating" the upper concrete slab on rubber mounts or thick pads of glass fiber. For adequate noise reduction between the mechanical equipment room and the executive office it may be further necessary to provide a solid, impervious, suspended ceiling in the office. These measures illustrate briefly the extent of some noise and vibration control treatments required to gain something like 40 db to 70 db in "transmission loss" through a structure of 3 ft. to 5 ft. thickness.

In the city treasurer's office of a municipal building, the floor vibration was so severe during the operation of the air conditioning system in the floor below, that the treasurer jokingly feared the aptness of the phrase "shake-down." It was determined that the compressor, though itself vibration isolation mounted, was rigidly connected to several pipes which were connected by rigid ceiling hangers to the overhead concrete slab, which was the floor of the treasurer's office. This was an excellent example of the effect of by-passing the isolation mounting with a rigid tie which essentially ruined the effectiveness of the isolation mount. For complete isolation of a piece of vibrating machinery, not only the machine but all of its connections should be installed with due regard to vibration isolation.

In the room beneath an auditorium, a 10,000 KVA transformer was housed in a sturdy concrete enclosure. The "hum" of the transformer in the auditorium was so annoying that the auditorium could not be used effectively. Investigation revealed that the concrete enclosure for the transformer was adequate to keep the **air-borne** noise to a low, undisturbing level in the auditorium. Measurements showed, however, that the vibration was **structure-borne** through the concrete structure and was radiated by the floor and near walls of the auditorium. Reduction of the "hum" in the auditorium was brought about by isolating the transformer on rubber pads and cutting the concrete foundation under the transformer free of the concrete floor slab of the room, which was on grade. Large rigid conduits connected to the transformer were supported by vibration isolation ceiling hangers and were required to pass through flexible stuffing boxes at each wall for large distances from the auditorium.

A delicate machining operation in a manufacturing plant was being ruined by the operation of a nearby high speed punch press. It was found that both the punch press and the precision machine were set in the same concrete floor slab. The floor slab around the punch press was cut free from the punch press foundation (on grade), and the precision machine was returned to its normal operation.

These examples demonstrate some of the measures used to achieve vibration isolation of noisy or vibrating machines. We might summarize the actual steps taken in a typical vibration isolation problem.

First, vibration isolation mounts must be selected or engineered. The selection of isolation mounts can be somewhat critical and should take into account the following factors: (1) the principal natural frequencies of the mounted assembly must not coincide with any of the operating or driving frequencies of the unit, (2) the vibration amplitudes of the mounted system at the various frequencies must be within certain limits for satisfactory performance of the mounted machine, (3) the stiffness of the mounting assembly must be approximately equal in all directions, and (4) the dynamic stiffness of the mount in vibration should be no more than approximately twice the static stiffness of the mount at rest. If some of these requirements

(Continued on page 46)

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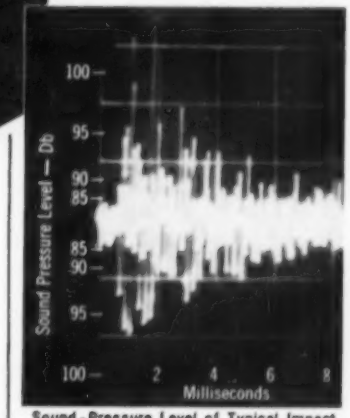

Sound-Pressure Level of Typical Impact

Sound-Level Meters and Spectrum Analyzers by themselves are inadequate for measuring the typical impact noise because of the extremely short duration of the transient, oscillatory sound-pressure-wave. The time constants of the meter circuits of common sound-level measuring instruments are much longer than the thousandth of a second it takes the typical impact noise to build up to its maximum level.

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1. **"Peak-Reading" Measurement**: indicates the maximum instantaneous level reached by the noise — meter needle stays at the peak reading to facilitate measurements; switching to "reset" position erases the stored level, making ready for next measurement.
2. **"Time Average"**: a measure of the average level maintained by the noise over a selected period of time (averaging time is set by the position of the "time-constant" switch) — the difference between the "Peak" reading and the "Time-Average" reading for a period of time is a measure of how long the impact-noise level remained near the peak level over the time interval.
3. **"Quasi Peak"**: a continuously indicating measure of the peak sound level. In this position, the electrical circuit has a fast rise time and a slow decay time so that the meter movement can follow reasonably well the peak levels of sound.

An electrical storage system is provided, making it possible to measure all three of the above characteristics for any single impact. "Peak" and "Time-Average" readings are both stored electrically for a period of many seconds, regardless of the function setting of the instrument, so that these impacts can be read accurately and conveniently and measured at the operator's convenience.

General Radio Company has long manufactured a broad line of sound-level measuring and analyzing equipment for steady-state measurements. But specialized instrumentation is needed for the accurate measurement of the short-duration transients characteristic of impact noises. The new G-R Impact Analyzer fills this need. It is the only instrumentation now available expressly designed for the *direct-reading* measurement of Impact Noises.

The Impact Noise Analyzer is an accessory to the Type 1551-A Sound-Level Meter. It attaches to the base of the latter instrument, making a compact, portable package. In operation, the transients produced by the impact are picked up by the Sound-Level Meter microphone. These signals are amplified by the Sound-Level Meter's amplifiers and then passed on to the Impact Noise Analyzer.

Three different readings are possible with the Impact Analyzer. These measurements permit determination of both the level and duration of the impact, essential characteristics of any impact noise.

There are many other uses for the Impact Noise Analyzer. Not only can this instrument be operated from the outputs of Sound-Level Meters, but it can be used in conjunction with magnetic-tape recorders and with spectrum analyzers such as G-R's Type 1550-A Octave-Band Noise Analyzer to analyze the frequency distribution of impact sounds.

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Figure 4 Prefabricated Types of Acoustic Enclosures May Be Used in Special Noise Environments.

Noise Control

(from page 44)

are not met, a vibration isolation mounting arrangement may actually be worse than a rigid mounting from the point of view of noise, vibration and performance. As a general note it is desirable to select a rubber-in-shear type mount which will provide a static deflection of approximately ¼ in. under load. For certain types of high-frequency, low amplitude vibration problems, a cork or felt or rubber pad may be used as the isolator. Manufacturers and sales engineers of vibration isolation mounts can usually provide design data and assistance in the application of their products to conventional isolation problems.

For rather unusual vibration problems, special mounting arrangements may have to be engineered. An excellent textbook [1] in this field is given in the references. These special problems involve a detailed knowledge of the various driving frequencies of the device, the weight distribution and relative motion of the machine and its moving parts, and the possible interactions between the machine and its supporting structure. These are rather specialized design problems and cannot be handled with generalizations.

The second step toward vibration isolation is the elimination of all incidental rigid structural ties between the vibrating machine and the critical area. In the example of the vibration of the floor in the city treasurer's office, rubber-in-shear vibration isolation ceiling hangers were required to support the pipes from the concrete slab overhead. The power lines to motor-driven machinery should be permitted to hang freely in one or two loops of non-rigid conduit between the vibrating machine and the remainder of the building. Rigid pipe connections should be replaced with flexible rubber, plastic, or metal mesh connections in order to reduce the vibration transmission into pipes. If the vibration amplitudes are large or if the pipes are liquid-filled, it is desirable to provide two flexible connections in each line; the two flexible connections should be located in pipe sections which are oriented 90° to each other. Sheet metal duct work between a blower and the ventilation ducts of a building should be separated by a flexible connection made of asbestos or unpainted canvas. When it is necessary to cut the floor slab free of a machine foundation on grade, it is desirable to make a 1 in. to 2 in. wide cut approximately 1 ft. to 2 ft. deeper than the bottom of the foundation and fill the gap with an asphalt impregnated layer of glass fiber board. At the floor line, the crack can be sealed with a mastic or caulking compound. If the machinery pad cannot be cut free of the floor slab, the machine may have to be mounted on a floating concrete slab which is supported by resilient mounts from the original concrete slab or pad. (This approaches the nature of an engineered mount and should be regarded in terms of vibration of the complete assembly.)

Enclosures and Barriers

In Case III of the examples given in last month's article it was indicated that the noise of an automatic punch press gave rise to complaints by shop and inspection personnel working in areas in the vicinity of the punch press. It was indicated from the noise level data and the recommended noise level criterion that the required noise reduction for the area should be approximately as shown in the accompanying Table I.

TABLE I

Required Noise Reduction to Meet Recommended Noise Level Criterion in a Particular Shop and Inspection Area in the Vicinity of an Automatic Punch Press

Frequency Band (cps)	Noise Reduction (db)
20–75	
75–150	8
150–300	16
300–600	22
600–1200	25
1200–2400	29
2400–4800	29
4800–10,000	23

It is impossible to achieve this amount of noise reduction by the use of acoustic absorption material on the walls and ceiling in the vicinity of the punch press, and it was considered impractical to move the punch press or move or modify the shop and inspection areas. After giving due consideration to the layout of the punch press (and its associated parts, such as the feed mechanism and the drive motor and gearing) and to the operator's accessibility to the machine, it was recomended that the punch press be enclosed by a complete enclosure (a room) large enough to satisfy all the operational needs of the operator and the machine. (See Figure 4.)

Now, when a noise source is located in a large open area, the noise radiated by the source spreads out in all directions, it is reflected by the floor, the ceiling, the distant walls and by all the obstacles in the area, and it sets up a "reverberant" noise level throughout the area. Usually at a distance of 10 to 20 feet or more from the noise source, the noise levels heard by the ear are a mixture of the noise levels due to the "direct" sound path from the noise source and the "reverberant" noise levels due to all the multiple reflections of sound around the area.

If the noise source is now enclosed in a small room, all the noise radiated by the noise source is contained

in a relatively smaller volume; the noise cannot spread out over as large a volume as before and the reflecting wall surfaces are brought much nearer to the source. The noise levels inside the enclosure are still a mixture of the noise levels due to the direct sound from the source and the noise levels due to the "reverberant" sound. But, since the reflecting surfaces are closer to the source and since the volume of the room is smaller, the reverberant noise levels are much higher than for the case where there was no enclosure. In fact, the reverberant noise levels usually become higher than the direct sound levels only a short distance from the source.

In determining the nature of the wall of the enclosure it is necessary to take into account these higher noise levels inside the enclosure and provide a wall whose acoustic "transmission loss" (in decibels) is larger than the "required noise reduction" for the problem. For the type of enclosure considered here, the transmission loss of the wall should be approximately 10 to 15 db higher than the required noise reduction. Several other factors enter into the exact value. These factors include the amount and type of acoustic absorption inside and outside the enclosure and the size and location of the enclosure walls relative to the overall building arrangement.

Suppose, for this example of the punch press enclosure, we determine that the transmission loss of the wall should be approximately 12 db larger than the required noise reduction. In the second column of Table II, this transmission loss requirement is given as a function of frequency band (first column). Three typical wall constructions which will meet this requirement are indicated in Table II as Walls "A," "B," and "C." Wall "A" is essentially any impervious wall having a surface weight of not less than 25 lb. per sq. ft. This might be made up of 4" thick hollow cinder block with both surfaces plastered to seal the pores of cinder block, or 4" thick hollow concrete block, or 2" thick transite or 2" thick pre-cast concrete slabs.

Wall "B" is a wall of conventional stud and plaster construction.[2] The studs may be 2" x 4" wood or 4" wide steel; the plaster should be a minimum of ¾" thick dense plaster on both surfaces (on wood or metal lathe). Wall "C" is a typical pre-fabricated metal panel wall made specifically for sound isolation purposes. The wall consists of two metal panels, minimum 18 gauge sheet steel, with a 3" to 3½" thick space between panels which is filled with mineral wool or glass fiber of density approximately 6 lb. per sq. ft. For each of these walls it is essential that any cracks or air spaces in the wall be sealed closed with a suitable sealing material. Plaster or mortar may be used on Walls "A" or "B" and caulking compound or a mastic material may be used on Wall "C." For these relatively light weight walls, a door and one or two small windows would not reduce seriously the over-all transmission loss. However, the door should be of solid core wood or of metal panel construction (somewhat similar to Wall "C" but possibly only 1½" to 2"

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TABLE II

Required Transmission Loss of a Particular Enclosure Wall (See Text for Description) and the Approximate Transmission Loss of Several Typical Walls

Band Frequency (cps)	Required Loss Transmission (db)	Wall "A" Transmission Loss (db)	Wall "B" Transmission Loss (db)	Wall "C" Transmission Loss (db)
20–75	5	28	20	20
75–150	20	32	25	24
150–300	28	34	29	30
300–600	34	37	34	35
600–1200	37	41	40	40
1200–2400	41	46	44	45
2400–4800	41	48	48	48
4800–10,000	35	50	54	50

thick) and the door should fit well in the door opening. The windows may be of approximately ⅛" thick glass and should be kept closed or sealed. Air passages through the wall for ventilation or for other purposes should be given proper acoustic treatment (see: Acoustic Absorption).

Where greater "transmission loss" is required, we need either more mass or more space, or both. To a first approximation the transmission loss of a wall increases about 5 db for each doubling of the wall weight, provided the wall material is truly impervious, i.e., non-porous. In Table II the transmission loss of the 25 lb. per sq. ft. Wall "A" is given. If the weight of the wall were increased to 50 lb. per sq. ft., the transmission loss values would increase about 5 db throughout the entire frequency range. If the weight were increased to 100 lb. per sq. ft., the transmission loss would increase another 5 db. (An 8" thick solid concrete wall has a weight of approximately 100 lb. per sq. ft.) To achieve the next 5 db increase in transmission loss would require a 200 lb. per sq. ft. wall, equivalent to 16" thickness of solid concrete. It is apparent that such heavy walls in many cases would be impractical structurally.

Double wall construction is used where relatively light weight construction is required in order to achieve high transmission loss. For example, two 4" thick concrete or brick walls with an air space between them have a significantly higher transmission loss than a single 8" thick concrete or brick wall. And the larger the air space, the higher the transmission loss. The approximate transmission loss of a few typical single and double wall constructions are shown in Fig. 5.

In order to attain the transmission loss values given in Fig. 5 for double wall construction the two walls must be structurally independent. The two walls should be constructed on separate foundations, or one wall should be resiliently supported relative to the other. Even a stud and plaster partition can be improved by supporting the two plaster surfaces on different sets of studs and increasing the air space within the wall.

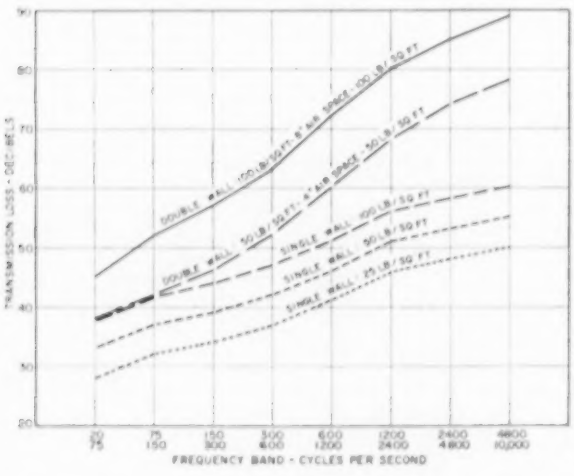
TRANSMISSION LOSS - DECIBELS
FREQUENCY BAND - CYCLES PER SECOND
DOUBLE WALL: 100 LB/SQ FT; 8" AIR SPACE; 100 LB/SQ FT
DOUBLE WALL: 50 LB/SQ FT; 4" AIR SPACE; 50 LB/SQ FT
SINGLE WALL: 100 LB/SQ FT
SINGLE WALL: 50 LB/SQ FT
SINGLE WALL: 25 LB/SQ FT

Figure 5 Approximate Transmission Loss of a Few Typical Single and Double Wall Constructions in Terms of Surface Weight of Wall.

Figure 6 Tight-Fitting Double Doors for Use in Walls Requiring High Acoustic "Transmission Loss."

For very high transmission-loss walls, special attention must be given to doors and windows in the walls. Windows usually must occupy only small areas in the entire wall; they may have to be double glazed with a wide air space between the glazing; they must be sealed airtight in their framing; and they may have to be of glass having ¼" or ½" thickness. Doors must be very heavy; they must close tightly against snug-fitting soft rubber or hollow rubber gaskets or interlocking metal weatherstripping; and the door closing mechanism must secure the door firmly and tightly against the door seal. For double walls, it is usually necessary to provide double doors—one door installed in each wall. (See Figure 6.)

An example of a double wall requirement is taken from last month's Case IV. In that example, an aircraft manufacturing company plans to construct a new building which will be located near the present jet engine run-up area. The transmission loss required of one of the outside walls of the building is approximately that given in Table III.

A number of wall constructions will essentially meet the requirement. Wall "D" is a single wall of 12" thick solid concrete with no windows. Wall "E" is a double wall consisting of one wall of 4" thick solid concrete block or brick, an air space of 4", and a second wall of 4" thick solid concrete block or brick. Wall "E" can have no windows. A number of wall and window combinations could be devised. Wall "F" is one in which the double wall consists of 8" concrete, 8" air space, and 4" concrete and the double windows are made up of ¼" glass with 16" air space between

TABLE III

Required and Estimated Transmission Loss for an Outside Wall of a Particular Building Exposed to Jet Aircraft Noise

Frequency Band (cps)	Required Transmission Loss (db)	Wall "D" Transmission Loss (db)	Wall "E" Transmission Loss (db)	Wall "F" Transmission Loss (db)
20–75	31	41	38	30
75–150	39	45	42	38
150–300	46	47	46	43
300–600	51	50	52	51
600–1200	54	54	60	57
1200–2400	55	59	68	63
2400–4800	52	61	74	70
4800–10,000	48	63	78	73

the glass. The maximum permissible window area is 10% of the total wall area for this particular combination. The approximate transmission loss of each of these wall constructions is given in Table III. Where an estimated transmission loss may not meet the required transmission loss by but 1 or 2 db in a few of the frequency bands, the wall would nevertheless be deemed satisfactory in a large expensive undertaking such as this building.

In many shop and office layouts, partial-height partitions are used to separate different internal areas. Typically these partitions may be 5 to 7 feet high in rooms whose ceiling heights might range upwards from 9 to 10 feet. The partitions may be single thickness sheet steel or glass panels or wall board on stud construction. The acoustical effectiveness of these partitions is not large but we will note the approximate range of noise reduction which they can yield. For noise coming from a remote source, say at a distance of 25 feet or more, or for noise of a general nature being generated all over the work area, a 50% high partition (example: 6 ft. high partition in a 12 ft. high room) will yield a noise reduction of only about 3 db on the opposite side of the partition at a large distance (25 feet or more) from the partition. For these same distances, a 75% high partition will yield a noise reduction of about 6 db, and a 90% high partition will yield a noise reduction of about 10 db. For noise which is generated quite near the partition or for the receiver located near, the partition serves somewhat as a shield against the direct sound path and the effective noise reduction may be somewhat higher than the values given above. For these cases, an acoustically absorptive ceiling above the partition will further increase the amount of noise reduction due to a nearby source or for a nearby receiver. The new type acoustically lined telephone booth found in noisy areas is a practical example of a partial enclosure which incorporates the shielding effects of a partial-height partition. (See Figure 7.)

There are many noise problems in industry which involve operator accessibility to a machine. If the machine is completely enclosed, it cannot be properly attended by the operator. If the machine is not enclosed, it is noisy. For many of these machines, combinations of partial enclosures, barriers and mufflers can be devised which will reduce the noise radiated from the machine area to some quieter, more critical area and yet retain to a considerable extent the necessary accessibility to the machine. Each machine would have to be treated individually by this approach in order to meet the requirements of accessibility and noise control. The sketch in Fig. 8 (taken from Reference 3) shows some possible arrangements of various types of partial enclosures or barriers for particular machines or work areas. Mufflers are included in these arrangements where it is desirable to have sound attenuating open passages through which materials or cooling air may flow or through which adjustments may be made or controls operated. It should be pointed out that the noise inside these partial enclosures will not be reduced, but the noise outside the enclosures can be noticeably reduced. To be most effective the interior walls of the partial enclosures

Figure 7. Partial Enclosure Lined with Acoustic Absorption Material Permits Satisfactory Telephone Use in Noisy Areas.

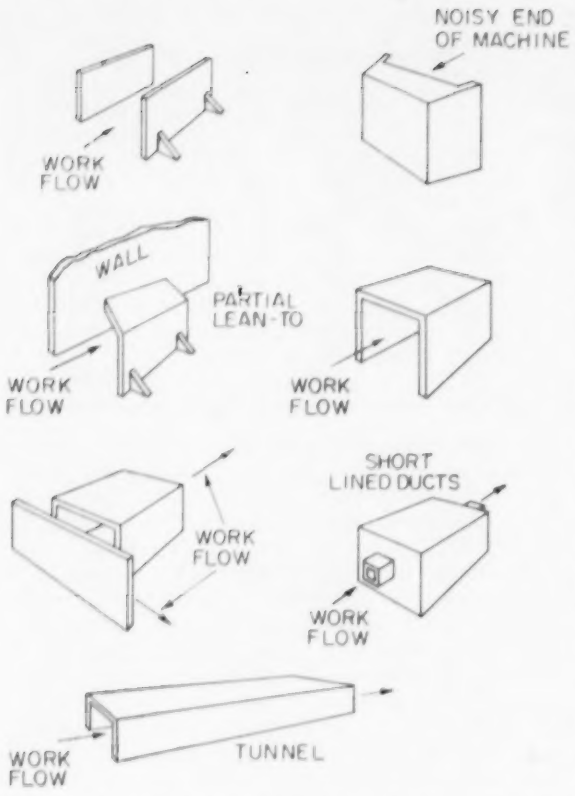

Figure 8 Some Typical Partial Enclosures for Use with Noisy Machines or in Noisy Work Areas.

should be covered with sound absorption material and the open area of the partial enclosures should be kept to a minimum.

Under the heading of enclosures and barriers we will also list ear defenders—ear plugs, ear muffs and noise helmets. (See Figure 1.) These devices represent the last possible step in noise control at the receiver. Although ear protective devices are generally uncomfortable, they are necessities to any person working in the very high noise levels of the jet engine and some of the other high-level noise makers of our time. Tight fitting noise helmets and rubber or soft plastic ear muffs or ear caps are the most effective ear defenders and ear plugs are usually somewhat less effective. All of these types give a higher noise reduction in the high frequency region than they do in the low frequency region. It is cautioned that ear plugs gradually work loose and have to be re-seated quite frequently (say every 15 to 30 minutes) in order to achieve and maintain the full noise reduction which is possible. It is recommended that ear plugs be used under competent medical supervision.

The noise reduction achieved by properly fitted ear plugs is approximately 10 to 20 db in the low frequency bands ranging up to approximately 20 to 40 db in the high frequency bands. For ear muffs and noise helmets the noise reduction is somewhat higher in all frequency bands.

Acoustic Absorption

When sound waves strike a hard smooth surface (such as concrete or steel) they are reflected by the surface with very little loss of energy. When sound waves strike a soft porous surface some of the vibrating air particles penetrate into the tiny pores of the surface and dissipate some of their energy. Acoustic absorption material is made specifically to absorb sound energy. It has a controlled porosity to encourage the penetration of vibrating air particles and it has a fine fibrous texture to encourage transfer of the vibrational energy from the air particles to the fiber material where it is converted to heat and dissipated.

Acoustic absorption material is most used in two general applications: (1) on the walls and ceilings of rooms in order to control noise transmission and decay about the room, and (2) in the construction of sound-attenuating mufflers for use in open passages. We will discuss each of these general applications.

Walls and Ceilings: In the above discussion on enclosures, a distinction was made between "direct sound" and "reverberant sound." It was indicated that the reverberant noise levels usually control the noise levels in a room beyond just a few feet from a noise source. It was also pointed out that reverberant noise is the noise which has been reflected many times from the floor, walls, ceiling and various objects in a room. If these various reflecting surfaces of a room are generally hard and smooth, the sound waves bounce off with very little loss of energy. However, if the surfaces are soft and porous, a significant amount of sound energy is absorbed each time a sound wave strikes the absorbent surface. For conventional types of approximately one-inch thick perforated, fissured or textured acoustical wall and ceiling materials, low frequency sound waves lose approximately 10% to 25% of their energy at each reflection and high frequency sound waves lose approximately 75% to 95% of their energy at each reflection. Other types of special wall materials can yield even higher acoustic energy absorption.

If a room is provided with a reasonably large amount of acoustic absorption material, the acoustic

Figure 9 "Functional Sound Absorbers" May Be Located Near Noise Sources.

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energy in the multiple-reflected sound waves will be partially absorbed and the reverberant noise levels will be lower than if there were very little absorption material in the room. For a typical room, the addition of conventional one-inch thick perforated acoustic tile over the entire ceiling area will reduce the reverberant noise levels from approximately 5 db in the low frequency bands to approximately 10 or 12 db in the high frequency bands. (See Figure 2.) The reduction will be less than this for points close to the noise source, for the "direct sound" controls at distances very near the source. Thus, it is seen that an application of wall and/or ceiling acoustic tile will be of little benefit to the nearby operator of a noisy machine, but it will reduce noise levels by perhaps 5 to 12 db for a person located across the room 15 to 20 ft. or more from the machine.

Some of the manufacturers are packaging their absorptive materials in box-like structures which can be hung from ceilings or otherwise supported near noisy machines. These "functional sound absorbers" can be strategically located relatively close to particularly noisy devices and can give somewhat more reduction to regions near the noise maker than can be provided by ceiling treatment on a possibly high ceiling or a distant wall. (See Figure 9.)

Acoustic absorption in a room can also be achieved in part by the use of room furnishings. Rugs, drapes, stuffed upholstered furniture and even people provide some absorption in a room.

In general, where it is desired to have a 5 to 15 db reduction of general background noise or of specific, rather distant noises, the use of acoustic absorption material would be recommended for a room. Even higher noise reductions can be achieved by this method but the wall or ceiling treatments become very specialized.

Open Passages: The second principal use of absorption material is in the design and construction of sound-attenuating mufflers for use in open passages. Exhaust mufflers for engines, intake mufflers for air compressors, and acoustic treatment in ventilation ducts are typical applications of absorptive material in sound-attenuating passages. Sound-attenuating mufflers which contain sound absorption material are called "dissipative" mufflers because the absorption material actually dissipates sound energy. Muffler treatments generally consist of lining the inside walls of the muffler (or duct) with acoustically absorptive mineral or glass wool or fiber. To attenuate effectively low frequency noise, it is usually necessary to have long lengths of thick linings. To attenuate high frequency noise, much shorter lengths of thinner linings may be used. If the cross-section area of the muffler is quite large it may be necessary to divide the large muffler into a number of smaller mufflers and provide linings for the smaller sections in order

(Continued on page 57)

KEEPING UP WITH

SKIN PROTECTION SERIES
other articles June and July

MEDICATED SKIN LOTION

The Pharmacal Division of Revlon Products Corporation has announced a medicated skin lotion to protect and heal hands subjected to harsh working conditions. Known as Silicare, it is a triple skin-healing product containing Tri-Derm, a combination of three drugs.

The water-repellent properties of the lotion resist strong detergents and water action, forming an invisible glove to protect the hands. According to the manufacturer, the lotion remains on the hands for as many as five ordinary hand-washings, actually healing hands even while being used in everyday tasks. Healing is said to result almost overnight.

For details, use **Key # SP-1** on Inquiry Card on page 35.

ANTISEPTIC LIQUID SOAP

The prevalence of germs carried from hand to hand and hand to mouth which cause much absenteeism among workers is said to be greatly reduced by daily use of "degerm," an antiseptic liquid hand soap developed by Huntington Laboratories, Inc. Due to a recent change in formulation, it now contains G-11 brand hexachlorophene as its medicating agent.

It is claimed that the regular daily use of "degerm" liquid soap with hexachlorophene will destroy up to 97 percent of all bacteria on the skin. In addition, the hexachlorophene forms a protective film that keeps bacteria at a low level as long as regular use is continued. "Degerm" is helpful in reducing the spread of colds, flu and other contagious infections and it has proved

to be an effective product for processing and beverage plant use. Tests by the manufacturer indicate that the liquid soap is mild and will not irritate normal skin no matter how often it is used. It has a pleasing fragrance and contains olive oil and a soothing emollient which makes hands feel clean and soft. It can be used freely without fear of toxicity. A concentrated liquid soap, it should be diluted before use with 2 or 3 parts of water. Available in 55, 30, 5 and 1 gallon containers.

For details, use **Key # SP-2** on Inquiry Card on page 35.

SKIN PROTECTION DEVELOPMENTS

POISON IVY PREVENTIVE

A new formula has been developed by the Research Department of the E. D. Bullard Company for the prevention and treatment of Poison Ivy, Oak, and Sumac. This new product, called "Bullard's Formula," contains the mineral Hectorite. This mineral has an endothermic action; it absorbs heat and cools as it dries. When applied prior to contacting poisonous plants, the formula acts as a preventive, and when applied following contact, it will relieve itching, stop spreading, check weeping lesions and aid in rapid healing of the rash.

Packaged in heavy-duty polyethylene tubes, it is greaseless and odorless, will not stain, and is said to contain no objectionable drugs or harsh chemicals, and therefore is safe to use around the eyes and sensitive areas of the body.

In the accompanying picture, poison ivy leaves were rubbed on the arm of a man very sensitive to Rhus dermatitis. The arm on the right was immediately treated with Bullard's Formula and did not break out. Forty-eight hours later the untreated arm on the left had broken out from wrist to elbow with blisters and an irritating itching rash. The formula was then applied and the photograph demonstrates how the condition had dried up in five days time.

For details, use **Key # SP-3** on Inquiry Card on page 35.

SILICONE SKIN CREAM

A new siliconized formula that the manufacturer claims gives double the effectiveness is now being offered in Go-Jo Protective Skin-Coat. The product reduces industrial dermatitis by developing a protective barrier to prevent infectious ingredients from penetrating the pores of the skin. Upon application, it protects hands like an invisible glove, retaining hard-to-remove ingredients on the surface and stopping penetration of grime, paint, inks, carbons, adhesives, detergents, etc. Samples available from Gojer, Inc.

For details, use **Key # SP-4** on Inquiry Card on page 35.

NEW CREAM SOAP

Announcement has been made of a new type soap that is claimed to be almost impossible to waste. Called SBS-60, it is a white, opaque, thick-bodied cream that does not run off the hands when dispensed.

Described by the maker, Sugar Beet Products Co., as the first major soap development in the last quarter of a century, SBS-60 can be used in both the washroom and the shower. Its cleansing action is suitable in areas where liquid, powdered or bar soaps are now used. A synthetic detergent produces effective cleansing action, while the presence of lanolin provides good skin conditioning. Additionally, SB-8, a non-toxic, non-irritating deodorizing agent combats body odors. The soap is dispensed from a disposable container. It is not necessary to mix or fill containers with the product. The manually operated dispenser meters out the correct amount for a hand wash and discourages wasteful usage.

For details, use **Key # SP-5** on Inquiry Card on page 35.

CREAM ANTISEPTIC

A cream-type medication for the treatment of cuts, abrasions, burns, chapping, sunburn, and insect bites has been developed by Johnson & Johnson. Known as First Aid Cream, it is said to fight infection,

relieve pain and aid healing simultaneously. It can be applied directly to open wounds and will not cause stinging or pain.

The primary ingredients of the medication are bithionol, benzyl alcohol, and eucalyptol, all blended in a water-miscible cream base. The anti-infection agent contained has a broad inhibitory bacterial spectrum and, in addition, can suppress for long periods of time the common bacterial flora of the skin which frequently contaminate an open wound, according to the manufacturer. In addition to its nosting feature, the medication is nontoxic, non-staining and greaseless. Available in a 1½ ounce polyethylene tube which after each use returns to its original shape.

For details, use **Key # SP-6** on Inquiry Card on page 35.

POISON PLANT OINTMENT

A-20 Zircreme, a poison plant ointment produced by the Medical Supply Co., now has an antihistamine additive which is said to increase its effectiveness, according to the manufacturer.

The ointment olso contains zirconium, a recently introduced treatment for poisonous plant dermatitis. While the zirconium additive provides the ointment with its curative properties, the use of antihistamine pyrilamine maleate is said to relieve the itching caused by poison ivy, poison oak, and poison sumac.

For details, use **Key # SP-7** on Inquiry Card on page 35.

DISPOSABLE DISPENSER REFILL CAN

The Chemical Corporation has announced that their Phlo waterless cleaner is now available in a disposable container to fit their regular dispensed units.

Simple to install, the refill can cover is removed and the container set on the dispenser unit. A hole punched in the top of the container releases suction, readying the contents for use. The handy disposable refill cans eliminate messy transferring of contents from can to a dispenser bowl.

For details, use **Key # SP-8** on Inquiry Card on page 35.

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(For details, use Key # U-21 on card on page 35)

SILICONE OINTMENT

Silconex (77 percent silicone) has been developed by Hygiene Research, Inc., as an almost universal skin protective ointment to prevent contact dermatitis in a large variety of industrial operations. Containing only 23 percent of inert mineral filler, it protects not only against water-dissolved material but also against organic solvents and mixtures containing oils, solvents, water or chemicals. It resists exposure to strong acids, alkalis, oxidizing agents, salts, detergents, antibiotics, protein solutions, allergens and

other materials, whether in water or organic solution.

The manufacturer claims the ointment has been highly effective in protecting against the severe exposure encountered in work with the drilling muds in oil fields, and is unaffected by the alkali, oil, water, salt and solid content of these muds. It is said to be effective in protecting against solutions used in photographic, dye and electroplating work and against chemical solutions generally. 1 oz. is sufficient for about sixteen applications to both hands. One application or, in extreme cases, two applications a day are ample for protection. The ointment is packaged in 1 oz., 3.2 oz. and 5 oz. tubes, as well as in 1 lb. jars. Literature and sample will be sent free upon request.

For details, use **Key # SP-9** on Inquiry Card on page 35.

SKIN CREAM DISPENSER

Designed for standard 120 mm. open mouth gallon jars, this skin cream dispenser by Med-Fac Laboratories will supply approximately 2000 applications. Known as the ESP Dispenser, it protects unused cream from atmospheric bacteria, mold, fungi, and dirt from other hands.

The unit can be used to dispense any of the Skin Cote products marketed by the company. Cream is dispensed in the necessary amount, avoiding wastage. Because of its simplified design, utilizing a plunger-type action, maintenance is reduced to a minimum.

For details, use **Key # SP-10** on Inquiry Card on page 35.

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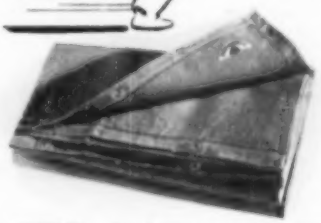

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(For details, use Key # U-22 on card on page 35)

TUBE DISPENSER FOR WATERLESS CLEANSER

SBS-30 waterless skin cleanser, manufactured by Sugar Beet Products Co., is now being packaged in a 5 oz. polyethylene tube for individual application. The new package is designed especially for the office worker or individual workman. A cream product, can be easily dispensed in just the right amount from the new tube by squeezing the pliable walls of the container. Because the tube will not dent, corrode, break or crack, is is appealing to the factory worker who keeps a supply of waterless cleanser in his tool box.

The 5 oz. tube contains an average of 60 waterless hand washes. The waterless skin cleanser is a cosmetic grade cream containing lanolin and other skin conditioning agents, and is used for the removal of many stubborn soils including grime, grease, tar, paint, varnish, ink. A safeguard against dermatitis, it aids both men and women.

For details, use **Key # SP-11** on Inquiry Card on page 35.

POISON IVY CREAM

The A. E. Halperin Co., Inc., has introduced a new poison ivy cream called Zocreme. The product contains 20 percent zirconium carbonate in a water soluble base, and is recommended for the prevention of contact dermatitis especially caused by contact with poison ivy, poison oak, and poison sumac.

The manufacturer also recommends the cream as a treatment for poison plant infections. It is packaged either two 1 ounce tubes per unit or six ¾ ounce tubes per unit. The latter packaging is suggested as a one dose application.

For details, use **Key # SP-12** on Inquiry Card on page 35.

SKIN CREAMS & CLEANER

Cadet Laboratories has made available three products for use in skin protection and cleansing. Hand-Saver, a protective cream, is applied to the hands before exposing them to solvents, acids, and caustics. The invisible coating shields the skin from irritants, remaining effective for many hours. Simple water-washing removes the film.

Handy, a waterless hand cleaner containing lanolin, is a fast-acting composition that removes grease, tar, grime, pitch, paint, and other difficult-to-remove materials. Containing no strong, harsh ingredients, it will not irritate the skin.

A lanolin-enriched, silicone-fortified protective coating, Sealskin offers waterproof protection for hands exposed to irritating chemicals, dyes, detergents, etc. According to the manufacturer, most dyes and stains wash off with soap and water without removing the coating, and perspiration does not affect the protective film.

For details, use **Key # SP-13** on Inquiry Card on page 35.

CREAM AND CLEANSER

A product that can be used both as a protective skin cream and also as a detergent has been developed by Plasco Safety Products Co. Designed to help prevent industrial dermatitis, Plasco-Creme also contains lanolin as a skin emollient. When used as a protector, the cream is applied to the dry skin before work to act as a barrier against dirt and grime. It can easily be removed after work by washing.

When used as a skin cleaner, the cream is rubbed into the soiled area, moistened, rubbed to a lather and rinsed off. It can also be used as a waterless cleanser by applying the cream liberally and wiping off on a dry cloth.

For details, use **Key # SP-14** on Inquiry Card on page 35.

LIQUID HAND CLEANER

According to the manufacturer, Scriptoil Laboratories, workers long plagued with skin eruptions caused by the cutting-oils which they are forced to handle daily can now effectively prevent dermatitis with the use of Scriptoil Liquid Hand Cleaner. Based on a new principle of detergency, and having undergone recent improvements with regard to the proportions of its ingredients, it clears cutting-oils from the skin when used twice daily as a hand cleaner.

Medical experiments have shown that cutting-oil dermatitis and folliculitis have been caused by the incomplete or improper removal of these oils from the skin. The liquid hand cleaner, it is said, removes these cutting-oils quickly, efficiently, and without irritation. Hard-to-remove substances such as paint, tar, pitch, putty, grime and grease can also be removed without using harsh abrasives or the like. The cleaner has recently been made available in a handy pint plastic container.

For details, use **Key # SP-15** on Inquiry Card on page 35.

WATERLESS HAND CLEANER

A newly-formulated waterless hand cleaner has been announced by the West Disinfecting Company. West Waterless Hand Cleaner is a white, liquid emulsion specifically formulated to remove soil, grease, inks, paints and grime from the skin. The new product, with mild, odorless ingredients, has an almost neutral pH and is, therefore, extremely mild to the skin.

The hand cleaner contains Lanolin, the skin emollient, along with a mild perfume which, together, leave the hands smooth feeling and with a pleasant odor. The company claims that it contains no harsh alkalis or abrasives and its repeated use will not cause a "defatting" of the skin.

For details, use **Key # SP-16** on Inquiry Card on page 35.

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to achieve adequate attenuation. The lined dividing walls are called "splitters" and the treated walls may become "parallel baffles." The thickness of the lining or the parallel baffles in low frequency mufflers may range from four inches to a few feet, and the cross-section area of the lining or baffle material may range from 30% to 60%, for example, of the total cross-section of the muffler. In high frequency mufflers, the thickness of the lining may be as small as one-half inch or one inch and the cross section area of the lining may be as little as 10% of the total muffler area. These values, of course, are only approximations and may vary for different needs; in general, however, these values represent reasonable ranges for the most economical treatments in terms of value of acoustic absorption material.

A large number of acoustic mufflers are described in the recent literature.[4, 5] We will not review all of these here, but we will note quantitatively the noise reduction which can be achieved with a few typical types.

Engine exhaust or air intake mufflers frequently are in the shape of long cylindrical tubes with an absorbent lining on the inside periphery of the tube. One particular muffler design with its approximate attenuation is shown in Fig. 10.

Parallel baffles are used in a number of different sound attenuating structures. These have been used in the intake plenum of large supply fans which open onto areas which must meet certain noise level criteria. They have also been used in the exhaust stacks of large supersonic wind tunnels. A typical layout of an array of parallel baffles is shown in Fig. 11. The attenuation provided by such an array is also given for a number of different spacings of the baffles. The design data given by Fig. 11 can be used for

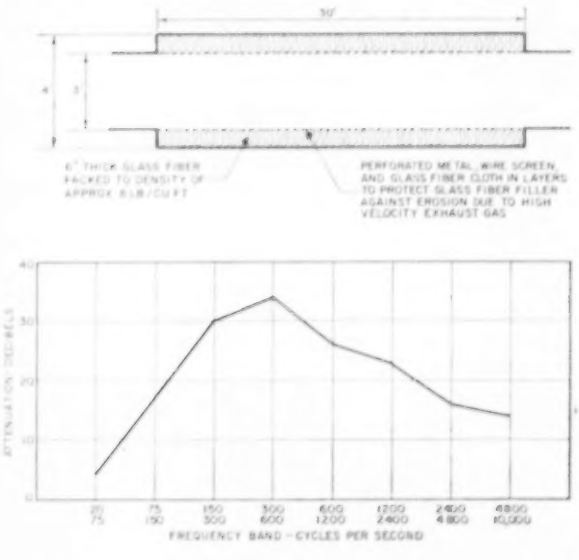

Figure 10 General Arrangement and Approximate Attenuation of an Engine Exhaust Muffler.

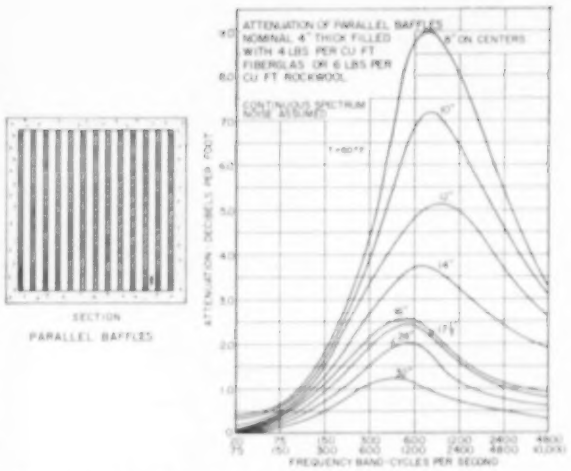
SECTION
PARALLEL BAFFLES
ATTENUATION OF PARALLEL BAFFLES
NOMINAL 4" THICK FILLED WITH 4 LBS PER CU FT FIBERGLAS OR 6 LBS PER CU FT ROCKWOOL
CONTINUOUS SPECTRUM NOISE ASSUMED
ON CENTERS
ATTENUATION - DECIBELS PER FOOT
FREQUENCY BAND - CYCLES PER SECOND

Figure 11 Cross-Section of an Array of Parallel Baffles as Used in a Supersonic Wind Tunnel Exhaust Stack and the Attenuation Provided by Parallel Baffles for Various On-Center Spacings.

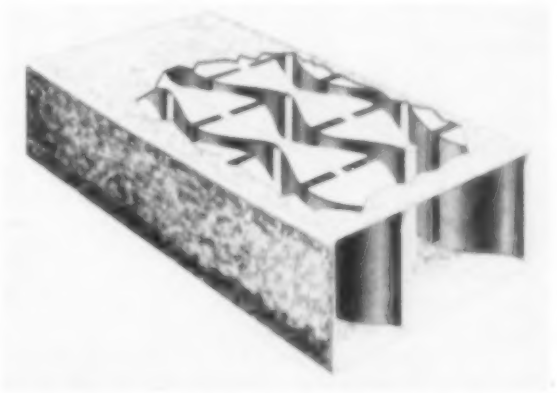

Figure 12 Acoustic Unit Provides Noise Reduction in Short Length of Ventilation Duct.

estimating the attenuation of individual ducts having four-inch thick lining, as specified, on opposite walls of ducts of various widths.

Mufflers or ducts containing 90° bends provide greater attenuation than straight-through mufflers. A 90° bend has the effect of reflecting part of the noise back toward the source. Even if there is no acoustic absorption material at the bend there will be up to approximately 10 db attenuation at high frequencies. When there is absorptive lining at the bend and a short distance beyond the bend, the attenuation due to the bend is somewhat greater. For a lined 90° bend in a muffler or duct which is approximately 2 ft. to 4 ft. on a side, the attenuation varies from practically zero at frequencies below 75 cps up to approximately 10 to 15 db in the frequency band 300-600 cps, and then to approximately 20 db in the high frequency band 4800-10,000 cps. Less attenuation than this will be provided by a duct of smaller cross-section dimensions; and higher attenuation, particularly in the low frequency bands, can be achieved with much larger duct size. The lining in a lined bend should have a thickness of approximately 1/10 to 1/20 the average duct width and the lining

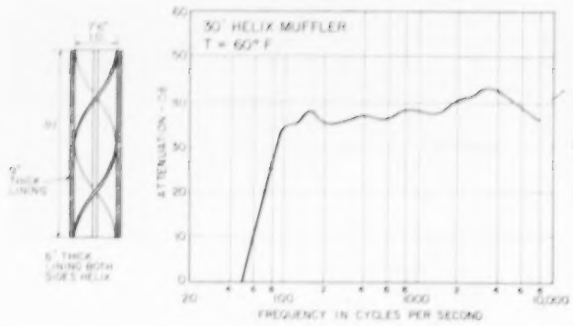

Figure 13 General Arrangement and Approximate Attenuation of a Helix Muffler.

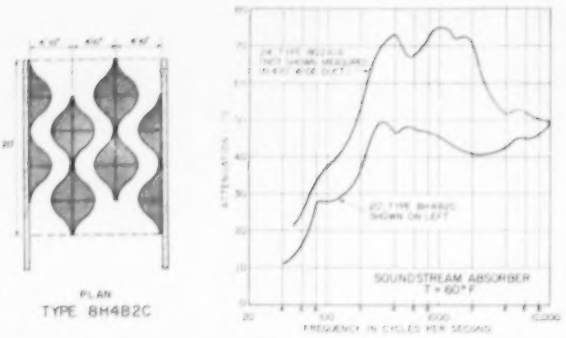

Figure 14 General Arrangement and Approximate Attenuation of a Soundstream Absorber.

should extend down the duct past the bend a distance of approximately twice the average duct width.

Several muffler designs have been introduced recently which combine the effects of sound attenuating baffles and lined bends. (See Figure 12.) The bends provide increased sound attenuation, and yet the change in direction of air flow is gradual enough that the mufflers do not have high back pressure for high speed air flow.

Two representative mufflers of this type are the helix muffler and the soundstream muffler. The schematic arrangement of a helix muffler is shown in Fig. 13. The attenuation produced by this muffler is also shown in Fig. 13. The surfaces of the helix and the interior surfaces of the duct are lined with an absorbent material. The thickness of the lining, the characteristics of the absorptive material, and the dimensions of the helix and the duct are variables which can be controlled to give the required attenuation.

The soundstream absorber is another combination of baffles and lined bends. The shaded areas of Fig. 14 represent absorptive units packaged to withstand high air speed and designed to give high attenuation and low back pressure. The attenuation of this unit is also shown in Fig. 14.

In addition to the attenuation of sound provided by a muffler, two other design features are important in the proper functioning of a muffler. First, the outside containing wall of the muffler must have a high transmission loss so that the noise inside the muffler will not pass through the wall instead of along the muffler passage. For example, if a muffler provides an attenuation of 40 db along the length of the muffler passage but has only a 10 db reduction for noise passing through the side wall, it would be an ineffective muffler. It is good practice to provide a balanced muffler design such that the noise reduction through the side wall is approximately the same or slightly greater than the attenuation along the passage.

The second design feature which is important is the packaging of the absorptive lining or baffles so that they will withstand the erosion effects of high speed and possibly high temperature air or gas flow. If the air flow in a lined ventilation duct is no more than approximately 10 to 20 ft. per second, it is usually adequate to use a vinyl coated duct lining material. The vinyl serves as a binder and holds together the tiny fibers of the glass or mineral wool. If the air flow reaches 25 to 35 ft. per second, the absorptive material should be protected by a cover of metal hardware cloth or chicken wire. For air speeds of 35 to 75 ft. per second, the fiber material should be protected by a cover of perforated sheet metal. The sheet metal is porous enough (approximately 25% to 35% open area) to permit free passage of vibrating air particles into the absorbent lining but it gives enough support and rigidity to prevent the lining from being torn apart fiber-by-fiber. For still higher air speeds, the fiber material should be incased in a cover of porous glass fiber cloth and a wire screen should be inserted between the perforated metal and the cloth-wrapped fiber material. At speeds of 100 to 150 ft. per second, the perforated facing vibrates quite severely and the screen serves to protect the baffles against this prolonged beating. At speeds above 150 ft. per second (above approximately 100 mph), the baffles must be protected with additional metal screens or metal wool or metal shavings held inside reinforced perforated metal facings. For very high temperatures the baffle material is limited to but a few types of materials which will not burn up or melt. Unbonded glass wool can be used for temperatures up to approximately 1000° F, and some new aluminum-silica wool materials can withstand approximately 2000° F. It is our understanding, however, that the acoustical characteristics of the latter materials are not yet well known.

Recall that all the mufflers discussed above are dissipative-type mufflers, i.e. they absorb and dissipate sound energy. There is another class of mufflers called "non-dissipative" mufflers. These mufflers absorb very little sound energy; principally they reflect sound back toward the sound source. Automobile and truck mufflers are the best known non-dissipative mufflers. Mufflers of this type are also used with many fixed-installation gasoline and diesel engines. The design of these mufflers is somewhat beyond the scope of this discussion.

Noise control by location can be considered both in the design of new layouts and in the use of existing layouts. A simple rule to try to follow is simply this: keep approximately equally noisy machines, processes and work areas together, and separate particularly noisy and particularly quiet areas by buffer zones having intermediate noise levels.

Let us illustrate the significance of that simple rule.

Remember that we talked about the annoyance of noise, and we said that annoyance caused by an intruding noise is a relative sort of thing which involves (1) the type of background noise in which we are working and (2) the nature of the work which we are performing in our own noise environment. Now, suppose that "A" is operating a noisy punch press and that 25 ft. away "B" is operating an equally noisy automatic screw machine. Each operator is making so much of his own noise that he isn't bothered by his neighbor's noise. Next, suppose that "C" is operating an accounting machine and that 25 ft. away "D" is operating a typewriter. Here, again, each operator is making enough of his own noise that he isn't bothered by his neighbor's noise. Finally, suppose that "E" is working feverishly over a hot slide-rule and that 25 ft. away "F" is busy manipulating manpower charts. With a little self-restraint these "operators" will be able to tolerate each other's noise also. Thus far we have no noise problem! This is noise control by location.

In a building layout it is desirable to achieve this kind of compatibility of noise conditions. In practice, the problem is to so arrange the functional areas of the entire building or plant layout that the noisy groups stay somewhat together and the quiet groups stay somewhat together. Such an arrangement provides a minimum of annoyance or interference due to noise.

Acoustically, it is wiser and more economical to locate a room full of business machines next to a mechanical equipment room of a building than to locate executive offices and conference rooms next to the mechanical equipment room. It is better to locate a blueprint reproduction room (with its intermediate noise levels) between a noisy shop on one side and a quiet engineering office on the other than to place the engineering office between the shop and the blueprint room. It is better to locate a noisy woodworking shop (with its screeching saws and planers and noisy dust collectors) at a remote corner of the plant instead of in the middle of the plant. Reasonable attention to building layout from an acoustical point of view will not eliminate all noise problems but it will certainly minimize them and provide more favorable working conditions for large proportions of the personnel.

Summary

In brief summary of this series of papers, we have tried to bring together four aspects of industrial noise. First, we have reviewed the psychological and physiological effects of noise on man. Second, we have shown the development of noise level criteria in terms of interference with speech communication, annoyance and hearing preservation. Third, we have seen examples of typical noise problems throughout various types of business and industry. And, fourth, we have reviewed some of the principal noise reduction or noise control methods and treatments which are available to the acoustical engineer. The entire series has touched only lightly on the various phases of noise control.

For a more complete analysis of the subject, please see the references identified in each article. To follow the most recent developments in practical acoustics and noise control, the reader is referred to the Acoustical Society of America (57 East 55th Street, New York 22, New York).

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3. "Design of Noise Control Structures" by D. B. Callaway, *NOISE Control*, September 1955.

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5. "Noise Attenuation of Dissipative Mufflers" by Ira Dyer, *NOISE Control*, May 1956, and other *NOISE Control* articles of 1955 and 1956.

Picture Credits: Figures 8, 11, 13 and 14 "Noise Control"; Fig. 1—American Optical Co.; Fig. 2—C. P. Clare & Co. and National Gypsum Co.; Fig. 3—Republic Aviation Corp. and Industrial Acoustics Co.; Fig. 4—Industrial Acoustics Co.; Fig. 6—Jamison Cold Storage Door Co.; Fig. 7—Burgess-Manning Co.; Fig. 9—Eliot Hanson, Inc.; Fig. 12—Koppers Co., Industrial Sound Control Div.

Three Safety Data Sheets

Publication of two new safety data sheets, arsenic trioxide (SD-60) and phthalic anhydride (SD-61) have been announced by the Manufacturing Chemists' Association.

Latest additions to a series of safety data sheets, the booklets give properties and essential information for the safe handling and use of the two chemicals, including material on shipping containers, storage, waste disposal and health hazards and their control.

Although hazards exist, both arsenic trioxide and phthalic anhydride can be handled, shipped and stored safely provided the employees involved are familiar with the recommended precautionary measures.

Copies of chemical safety data sheets, SD-60, arsenic trioxide, and SD-61, phthalic anhydride, are available from the Manufacturing Chemists' Association, 1625 Eye Street, Northwest, Washington 6, D. C., at 30 cents each.

The publication of a new safety data sheet on Propylene (SD-59) has been announced by the Manufacturing Chemists' Association.

The 14-page booklet, part of a continuing series of safety data sheets, gives properties and essential information for the safe handling and use of propylene, including material on shipping containers, storage, waste disposal, and health hazards and their control.

Although toxic and flammable, propylene can be handled, shipped and stored safely, provided the personnel handling the product recognize the hazards and are thoroughly familiar with the necessary precautions. Details of personal protective equipment and first aid are dealt with in the body of the data sheet.

Copies of Chemical Safety Data Sheet SD-59, Propylene, may be obtained from the Manufacturing Chemists' Association, 1625 Eye Street, Northwest, Washington 6, D. C., at 30 cents each.

Achievements and Awards

Mr. Robert A. Muller, President of Atlas Plywood Corporation, has announced a new program for the awarding of safety emblems to employees, based on accident-free years.

Mr. Muller noted that while the Bureau of Labor Statistics recorded a slight injury frequency increase in plywood mills, Atlas Plywood has recorded a frequency of approximately 15% below the industry average.

• • •

One hundred and twenty men of The Atlantic Refining Company's Philadelphia Refinery machine shop have been honored by the Safety Council of the Philadelphia Chamber of Commerce for their outstanding safety record of 15 continuous years of work without a disabling injury. This achievement represents more than 2,600,000 hours of safe operation during the period of January, 1941, to January, 1956.

A similar citation has been awarded to the machine shop by the American Petroleum Institute. The machine shop has continued since the first of the year with no lost-time accidents and is approaching the three million man hour mark of safe operation.

• • •

Richland's community workers won General Electric's coveted General Manager's Safety Award recently. On June 11, they completed their 756th working day without a disabling on-the-job accident, Safety Supervisor F. J. McKinnon announced. The Safety Award has been won only once before in the nearly ten years GE has operated Hanford for the Atomic Energy Commission. Production workers qualified for it on September 13, 1954. Every GE community worker was invited to select one of a list of 15 prizes. Hanford's General Manager's Safety Award is based on man hours of exposure to accidents. McKinnon said he feels the record just set by Community is quite notable, since in their daily dealings with the public and with emergencies these workers are exposed to an unusual number of hazards. Included in the group qualifying for the award are members of Richland's police and fire departments, public works, Kadlec Hospital, water, sewerage and electric utilities and other municipal services.

Safety consciousness on the part of every worker plus a keen safety interest on the part of supervisors were tabbed by McKinnon as the reasons behind the record. Workers attend frequent safety conferences, and special safety equipment such as safety shoes and goggles are in constant use.

In at least one instance, safety goggles preserved the unit's record during the 756 injury free days. A bulldozer driver working in Richland's disposal area was saved from probable eye injury when the goggles he was wearing stopped flying glass from fluorescent tubes crushed under the treads of his dozer.

• • •

Thirty-three operations of the subsidiary companies of Bethlehem Steel Corporation have received National Safety Council awards for outstanding performance in safety during the calendar year 1955.

Of the 33 awards, 17 are the highest the Council can bestow—the Award of Honor. Eight others are the Award of Merit. Four are the Certificate of Commendation and four are the Safety Council's President's Letter.

Recipients of the Award of Honor are: Bethlehem Steel Company's plants at Bethlehem, Lebanon, Sparrows Point, Lackawanna, Johnstown, and Williamsport, and works at Bethlehem, Steelton, Buffalo, Rankin and Leetsdale; Bethlehem Pacific Coast Steel Corporation's plant at San Francisco and works at Alameda; Bethlehem Supply Company's Tulsa, Okla., plant; plants of Buffalo Tank Corporation at Buffalo, N. Y., and Dunellen, N. J.; and Bethlehem Mines Corporation's Marion Division.

The Award of Merit went to Bethlehem Steel Company's Pottstown and Johnstown works; the Seattle plant of Bethlehem Pacific Coast Steel Corporation; the Steelton, Naginey, Hanover and Bridgeport quarries of Bethlehem Limestone Company; and the Johnstown Division of Bethlehem Mines Corporation.

Receiving the Certificate of Commendation were Bethlehem Steel Company's Bethlehem Weldment shop, the Foamed Slag plant at Sparrows Point, the Clearing, Illinois, reinforcing bar fabricating shop and wire rope mill depot and the Seattle Works of Bethlehem Pacific Coast Steel Corporation.

Operations receiving the President's Letter were the Bethlehem, Pa., Slag plant, the reinforcing bar fabricating shop and wire rope mill depot at Baltimore, and the Charlotte and Raleigh, N. C., plants of Buffalo Tank Corporation.

• • •

Scott Paper Company's Chester, Pennsylvania plant has won the Award of Honor presented annually by the Pulp and Paper Section of the National Safety Council.

The award was in recognition of the plant's lowest injury frequency incident of Group "A" plants.

WHAT'S THE LAW?

FEDERAL EMPLOYERS' LIABILITY ACT
—Railroad Maintenance Man—Safe Place to Work

In an action under the Federal Employers' Liability Act, the parents of a deceased maintenance man were properly granted a judgment of $10,000 for their son's pain and suffering and $35,000 for pecuniary loss for their son's death caused by his coming into contact with a high tension line while painting a bridge where the evidence was sufficient to sustain the finding of negligence on the part of the railroad in not providing the decedent with a safe place to work. The court ruled that there was evidence from which the jury could conclude that the weather was wet and stormy and that the railroad foreman decided that the work should continue and that only a part of the wires need be de-energized. Under such circumstances the jury could reasonably conclude that the railroad was negligent in failing to provide the decedent with a safe place to work. Affirmed.

RENALDI VS. NEW YORK, NEW HAVEN AND HARTFORD RAILROAD CO., United States Court of Appeals, Second Circuit, No. 23,663 March 6, 1956. Appeal from the United States District Court Southern District of New York.

LUNCH-HOUR INJURY—Fall on Ice on Employer's Premises

A multigraph machine operator was improperly awarded compensation for injuries sustained when she slipped and fell on some ice while going to the company cafeteria on her employer's premises during her lunch hour where the lower court held that the injury did not arise out of and during the course of her employment. The court ruled the right to control the actions or activities of the employees during the noon lunch period was absent. During this period her employer had no control over her actions, nor can it be said that she was actively engaged in rendering a service to her employer. The court further ruled that the claimant at the time of her injury, was engaged solely on a personal mission of her own, not then performing any service or duty for her employer. Reversed.

MACK VS. REO MOTORS, INC., Michigan Supreme Court, April 2, 1956.

SILICOSIS—Total and Permanent Disability—Sufficiency of Evidence

A coal miner was properly awarded compensation for total and permanent disability due to silicosis where the proof showed that he had been injuriously exposed to free silica dust for many years. The preponderance of the medical evidence showed that claimant suffered from silicosis while employed by the mining company, and that his condition grew progressively worse resulting in total and permanent disability. The proof also showed that the room in which the claimant worked was poorly ventilated. Affirmed.

EGGERT VS. TENNESSEE PRODUCTS & CHEMICAL CORP., Tennessee Supreme Court, February 3, 1956.

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inside the trade

STROMBERG-CARLSON, a division of General Dynamics Corporation, has announced the appointment of *Leo A. Miller* as Safety Director.

Mr. Miller, a member of the American Society of Safety Engineers, has had more than 18 years of experience in safety work, and for the past 11 years was a safety engineer with the Utica Mutual Insurance Company. In this capacity he frequently served as a consultant to Stromberg-Carlson on safety matters.

Arthur A. Williams, 78, chairman of the board of *GRATON & KNIGHT COMPANY*, Worcester, Mass. died June 9 at his home in North Grafton, Mass.

He joined the 105-year-old manufacturer of industrial leather products in 1937 and became a director the following year. He was elected chairman of the board in 1942 and president in 1944.

Mr. Williams was among the first to develop a safety shoe and founded the Safety First Shoe Company and Good Will Shoe Company, both safety shoe factories in Holliston, Mass.

He was awarded a medal by the National Association of Manufacturers for his contribution to the shoe industry with his invention of safety footwear.

OXY-CATALYST, INC., Wayne, Pa., manufacturers of catalytic air pollution control systems for industry and the home, announces the appointment of *Van Horn Ely, Jr.*, as president.

He succeeds Eugene J. Houdry, noted scientist who founded the company in 1950. Houdry moves up to the newly created position of chairman of the board where he will continue to direct the company's research and development work.

Mr. Ely predicted that the current success of the company in marketing air pollution control equipment for industrial plant stacks, catalytic mufflers that eliminate engine exhaust fumes and a coated wire catalyst designed to eliminate smoke and odors in the home should lead to substantially increased use in the future.

GOODYEAR TIRE & RUBBER COMPANY's Industrial Products division, has announced the retirement of *H. D. "Judge" Foster*, sales manager after 43 years service with the rubber firm.

Mr. Foster's career spans the entire life of Goodyear's Industrial Products division. He joined the firm in 1913 when the division was formed and helped pioneer in the mechanization of many industries. The development of hundreds of products was influenced by his thinking and experience. A real "jack-of-all-trades," Mr. Foster followed the early creed of the division to make the best product possible.

The *VAN STRAATEN CHEMICAL CO.*, has moved its sales headquarters and main laboratory into new quarters in its own two-story building, at 630 W. Washington Blvd., Chicago, announces Herbert van Straaten, president. The company makes industrial cutting, grinding and metal cleaning compounds.

D. J. (Don) Wriggelsworth has rejoined the special services department of *GRO-CORD RUBBER CO.*, Lima, Ohio, following a short leave of absence, according to an announcement by Forest Moor, president of Gro-Cord.

Mr. Wriggelsworth will be Industrial Sales Promotion Manager for Gro-Cord, which specializes in the manufacture of soles and heels for work and safety shoes.

A veteran of many years experience in the specialized work and safety shoe field, Mr. Wriggelsworth is well known among industrial safety engineers and manufacturers of workshoes. He will work out of Gro-Cord's main offices in Lima.

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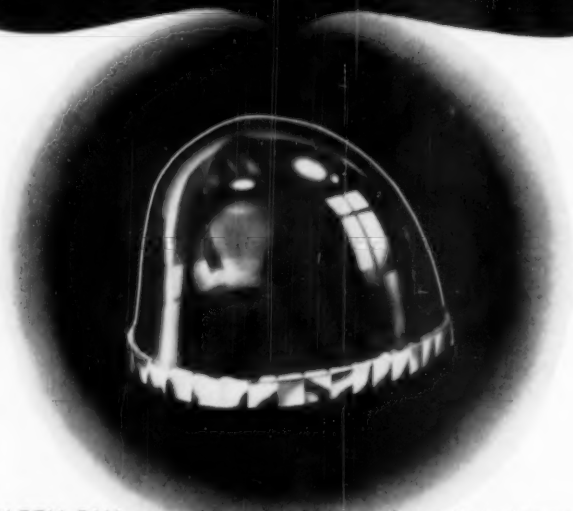

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what's new for AUGUST

LIGHT METAL DOCK PLATES

(Use Key # 889 on Inquiry Card on page 35)

A NEW line of light weight dock plates has been introduced by Magline Inc., and designated Magna Lum Truck Plates. For use on truck docks only, the new units are made of high strength magnesium alloy, and are easily handled by one man.

Nine standard sizes are available, from 36" to 72" wide, and from 24" to 48" long. Load ratings are from 1,800 lbs. to 4,800 lbs. axle load. Features include: positive position stops to securely lock the board in place between the dock and carrier; beveled plate edges to minimize load jar and prevent load loss; crowned construction to prevent 'hang-up' of low underclearance equipment, and provide safe, smooth cross-over.

LUBRICANT ADDITIVE

(Use Key # 890 on Inquiry Card on page 35)

MOLY-SULFIDE, a lubricant additive for chassis greases, has been developed by the Climax Molybdenum Co. The company does not add Moly-Sulfide to grease or Moly-Sulfide greases. The additive is supplied to oil and grease manufacturers. It is now being tested on delivery trucks, long-distance trucks and trailers, buses, etc., to check its performance under actual road conditions. Prior laboratory and field experiences have indicated that the addition of three percent Moly-Sulfide to chassis grease reduces wear on critical points and extends the lubrication period.

The additive functions by depositing out of the grease in a thin film that adheres to the steel in the part being lubricated. When the grease is washed or wiped out of the bearing, the additive is still present to keep bearing surfaces lubricated until the grease is restored.

FIRE BLANKET & CONTAINER

(Use Key # 891 on Inquiry Card on page 35)

FITE RITE asbestos fire blanket in a self storing container is designed for emergency use. Manufactured by the Cotton Goods Mfg. Co., it has many applications for saving lives and protecting machinery from fire. The blankets are available in either 10 cut commercial grade woven asbestos cloth (2.25 lbs. per sq. yd.) or 10 cut underwriters grade (2.50 lbs. per sq. yd.)

The blanket is made with a large top hem so it may be hung on a rod as a curtain for special uses and can be obtained in two sizes, 6' x 6', and 6' x 8'. The container resembles a conventional fire extinguisher, measuring 9" in diameter and 19" long. Made of 24 gauge steel, it is finished in red crackle with its interior flash-coated. May be used as portable equipment.

REMOTE ALARM SYSTEM

(Use Key # 892 on Inquiry Card on page 35)

A NEW automatic remote alarm system, offering both audible and visible warning for equipment failure or overload, and for hazardous conditions or intrusion, has been announced by Sparton Control Systems Div. It is particularly adaptable to facilities and operations spread over large areas but not under continual observation.

The system works over a 2-wire pair or single wire and ground return up to several miles, or can utilize conventional communication circuits. It is said to produce a blast audible for more than 2500 feet. Any condition that will operate a switch or relay will trigger the alarm. Complete alarm systems are available with sensing devices for: electrical and physical load; gas detection; fire or intrusion; position; or other process functions. The basic alarm unit is also available for integration in other control or alarm systems.

SELF-POWERED SIGNAL HORN

(Use Key # 893 on Inquiry Card on page 35)

DEVELOPMENT of a new self-powered and explosion-proof signal horn designed for use in industrial plants and other applications has been announced by Falcon Alarm Co., Inc. The portable horn is said to have an open-air audible range of 1,000 feet on industrial sites, and can be heard more than 150 feet above the average plant's ambient noise level.

The Dual-Tone Signal Horn creates a sound ranging from 116 to 120 decibels and will blow continuously for more than a half hour, or sound a minimum of 500 five-second warning blasts without recharging. Powered by non-deteriorating, non-toxic du Pont Freon, it provides signals for industrial application despite electric power failures. Its two horns of slightly different pitch are operated either by a toggle valve or remote-type lanyard. Horns and control valves on the signal device are protected by steel guards and carrying handles. Gross weight, when filled with Freon, is approximately 25 pounds. The new horn measures 20 inches high and has an outside diameter of 12 inches.

FOLDING STRETCHER

(Use Key # 894 on Inquiry Card on page 35)

THE NEW Model 18, Fold-A-Way stretcher, introduced by Washington Products Co., has been especially designed for police, fire, first aid rescue squads, civil defense teams, factory first aid and hospital teams, etc. Its strong aluminum frame gives strength with light weight.

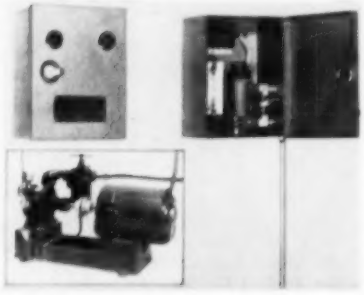
Extension handles with rubber grips provide safe hand-holds, and prevent strain or injury to the carriers. The back rest is adjustable from a flat position to any of four raised positions. It is easily folded and stored when not in use.

RESILIENT COATING

(Use Key # 895 on Inquiry Card on page 35)

A NEW weatherproof coating has been developed by the Air Research & Development Command, U. S. Air Force, in conjunction with the B. F. Goodrich Co. Called Radolon, it is described as suitable for application to such items as tents, tarpaulins, canvas covers, etc.

The coating has a non-blocking quality which prevents the protected item from adhering to itself when folded. Coated materials will not crack or deteriorate when subjected to extreme temperatures, and it is said they require little maintenance, such as patching, for two or three years.



GAS DETECTOR ACCESSORY

(Use Key # 896 on Inquiry Card on page 35)

CONTINUOUS guard against explosions in areas of extreme temperature or inaccessible locations can now be reliably maintained with a Sample Drawing Accessory to the standard J-W Model E combustible gas alarm, according to the manufacturer, Johnson-Williams, Inc.

The accessory (pictured with front panel open), mounted in a non-hazardous location, draws a sample continuously through a copper line from a remote danger area. Typical applications include: a baking or drying operation or an engine-testing room where extreme temperatures are normal; wherever excessive dirt, moisture, or other foreign matter are present; wherever gas is present under slight pressure such as in a tank or drum; an inaccessible area such as an underground tunnel, a trench, a pit, etc.

Outside fittings on the accessory provide for connection of the sample line to a vacuum source for forcing the sample flow if necessary. A high-quality pump (pictured inset), driven by a ¼ h.p. motor and specially recommended for this purpose, is offered at additional cost. Also contained in the Sample Drawing Accessory are a flow meter and flow adjusting valve. Detection and warning of dangerous gas concentration are accomplished exactly the same as with the standard J-W Model E. A sensitive, flashback-protected filament in the Sample Drawing Accessory reacts to combustible gas in the sample flow. At 0.2 of the lower explosive limit, an electrical signal actuates an alarm circuit in the control box, which is usually mounted alongside for convenient servicing.

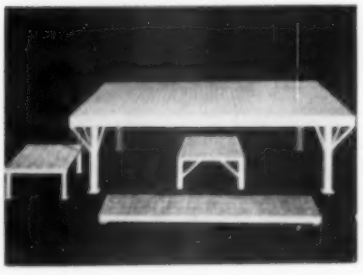
NEW HEAT-RESISTANT LEATHER

(Use Key # 897 on Inquiry Card on page 35)

INSULEATHER, a new product to be used in the manufacture of mitts for foundry workers has been announced by Jaxco, Incorporated.

The new process used in producing Insuleather is said to not only provide greater heat-resistance, but also prevents the material from becoming brittle when subjected to intense heat. Insuleather, in addition, resists shrinking when subjected to heat.

A simple but scientifically controlled laboratory test has proved that Insuleather remains pliable when subjected to 1000 degrees of heat for 30 seconds. Shrinkage was held to approximately 10 percent. The leather retained no heat from the test and could be handled immediately. Under the same conditions a special formula leather used in the manufacture of protective clothing started to ignite. At the end of the 30 second period it became rigid and brittle. Shrinkage amounted to 37.5 percent. A third test was made on leather used for protective garments with approximately the same results as special formula leather, with the exception that in the third test the material in addition to shrinking, curled and then became so brittle that it cracked when handled.

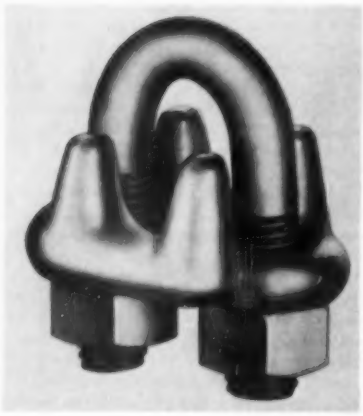


CUSTOM-BUILT SAFETY GRATING

(Use Key # 898 on Inquiry Card on page 35)

IN ADDITION to its standard line of Firm-Grip safety-grating products, Bustin Steel Products, Inc., is offering a new series of heavy-duty, long wearing custom-made products for industry. The new line, which includes safety-tread work platforms, stairs, duck boards and floor racks, has been introduced to provide industry with custom-made safety devices to meet specific requirements not covered by standard safety-grating equipment.

In addition to providing safety work platforms of any desired shape to meet particular applications, this new line enables the user to specify the exact height required, the precise type of safety grating desired and the load limit which the structure must meet. Illustrated are one large and two small work platforms, each showing a different type of construction, and a floor rack which is mounted on soft neoprene bumper blocks to cushion shock and reduce worker fatigue.

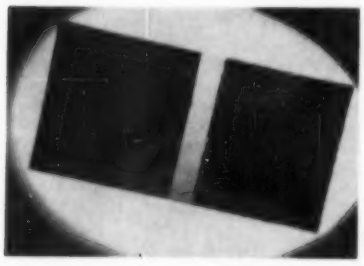


WIRE ROPE CLIPS

(Use Key # 899 on Inquiry Card on page 35)

DESIGNATED ACCO Wire Rope Clips, these assemblies are drop-forged from high grade steel and are said to provide positive "grips of steel" for tough, heavy-duty service. Introduced by the Wire Rope Divisions, American Chain & Cable Company, Inc., the clips are pre-packaged for convenience. Their base channel is shaped to hold wire rope securely without damage to individual strands. They can be applied on the job and no vise or other special tools are required.

The U-bolts are protected against the formation of rust and corrosion by hot-dip galvanizing after threading. Further protection is added by a green chromate coating which is applied after the galvanizing. The green chromate color also aids product identification. Bases of the assemblies are also hot galvanized as are the Standard American hex nuts. The clips are manufactured to secure wire ropes of $\frac{1}{8}$ inch to $1\frac{1}{4}$ inch diameters. For the smaller assemblies, $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, and $\frac{3}{8}$ inch sizes, they are packaged in lots of 100; for the $\frac{7}{16}$, $\frac{1}{2}$, $\frac{9}{16}$, and $\frac{5}{8}$ inch sizes, they are available in packages of 50; for the $\frac{3}{4}$, $\frac{7}{8}$ and 1 inch sizes, in lots of 25; and for the $1\frac{1}{8}$ and $1\frac{1}{4}$ inch sizes, in lots of 10 to a package. Weights range from 6 lb. per package for the smallest size to 50 lb. per package for the largest unit.



NON-SKID FLOOR COATING

(Use Key # 900 on Inquiry Card on page 35)

DEVELOPMENT of a new skidproof coating for industrial floorings which is brushed on like paint has been announced by the Building Products Division of L. Sonneborn Sons, Inc. Called Sono-Grip, it gives a nonslip finish to wood and concrete floors, steel treads and metal decks. It can effectively be used to resurface worn steel matting.

Sono-Grip is resistant to gasoline, alcohol, oil, grease and many types of acid. It provides nonslip protection whether the surface is dry, wet or oily. One or two coats will cover any properly prepared surface, according to the manufacturer. It contains a fine, sharp aggregate which gives it high slip-proofing qualities, and also features unusual elasticity and bonding characteristics, adhering well to smooth surfaces.

In the above photo, the left half of the sample steel plate has been painted with ordinary paint; the right half has been painted with the non-skid coating. Available in red, green, yellow and gray.

GRAPHITE LUBRICATION GUN

(Use Key # 901 on Inquiry Card on page 35)

A NEW graphite container and gun that dispenses graphite with a squeeze of the fingers, is being marketed by the Servwell Products Co. Small enough to hold in the hand, it sprays dry lubricant at its target while held in any position. Enough graphite is contained in the unit to permit several thousand "shots" of lubrication to various parts and pieces needing lubrication. A rubber squeeze-type bulb is attached to the container to provide a fine spray that is easily directed to the target without squirting or clogging.

The Blaco Graphite Gun's fine-powdered graphite spray penetrates into the smallest openings to embed itself well into the surface for long lasting lubrication. Because gun-sprayed graphite does not run, drip, freeze, melt or dry out, it is ideal for lubricating items made of metal, rubber, wood, leather, paper, etc. A light finger-tip squeeze on the rubber bulb, with nozzle held close to the object, delivers a light or heavy spray with pin-point accuracy. Large areas up to 100 square inches are easily covered by full finger-tip pressure on the rubber bulb. The area to be covered and the output of spray is determined by the distance the nozzle is held from the object and the pressure exerted.

FLOOR MACHINE SAFETY SWITCH

(Use Key # 902 on Inquiry Card on page 35)

DESIGNED for complete safety when operated in explosion or fire hazard areas, this floor machine features a new switch mechanism that turns the machine off automatically when operator releases grip. The switch itself is mounted in a sealed unit on the motor and is controlled remotely by a single lever on the handle. The need for a bulky sealed switch unit on the handle has been eliminated, thus improving balance and handling ease for the operator.

The machine is also equipped with a Silent-Flo power transmission which eliminates all metal-to-metal contact in the drive housing. Available in two brush sizes, 14" and 16".

ANIMATED SLIDE FILMS

(Use Key # 903 on Inquiry Card on page 35)

THE sound slidefilm, used for many years by commercial and industrial companies for safety training and education, is now available in a relatively new and more lively dress, the filmograph. Transfilm Incorporated, has announced that the filmograph can be used on a standard 16mm motion picture projector, whereas a slidefilm requires a 35mm projector and record player.

Filmographs are basically sound slidefilms except for the addition of camera movements in the filming process. Known as zooms, pans, fades and lap dissolves, etc., these motions and special effects give action to otherwise static slidefilm drawings. A Transfilm spokesman said that filmographs are available at a somewhat higher cost than comparable slidefilms. Not intended to replace the slidefilm, they are designed to fill the needs of companies desiring film presentations which are more elaborate than slidefilms, but less expensive than animated motion pictures.

Where television exposure of a film is a prime target, Transfilm recommends a motion picture, either live action or animation. Motion pictures such as "Wheel Sense," produced by Transfilm for Studebaker, are extremely popular. This film, dealing with safe driving practices, has had 550 TV showings and has been seen by more than 40 million people.

HEAT RESISTANT PAINT

(Use Key # 904 on Inquiry Card on page 35)

A QUICK-drying heat resistant paint for use on surfaces subjected to temperatures up to 600 degrees F. is announced by Speco, Inc. Known as Heat-Rem QD Black, it is said to air-dry to a tough, bright finish in less than 2 hours. In addition, it is reputed to achieve maximum effectiveness without special baking and to have no objectionable odor during application. It can, as a result, be used in any quantities without interrupting regular work schedules.

According to the manufacturer, QD resists extreme temperature variations, smoke, moisture, fumes, mild industrial acids and alkalies. It is recommended for protecting steam lines, vats, separators, exhaust manifolds, stacks, tanks, ovens and heat lines. Applied by either brush or spray, it covers approximately 500 sq. ft. per gallon. It is available in quart and gallon cans, 5-gallon pails, 30 and 55-gallon drums.

NEW FLOOR MACHINE

(Use Key # 905 on Inquiry Card on page 35)

BRUER Electric Manufacturing Company has announced a new model in their Tornado floor scrubbing and polishing machine line. The 13" floor machine is known as the "Light Heavyweight." The company points out that it has been designed with the minimum weight to do an adequate scrubbing or polishing job, yet is light enough to be carried. It features a free floating double tube handle that eliminates the usual "whip" associated with the operation of many floor machines. The handle also locks in the upright position for carrying or storing.

Operation is by a single lever switch located under the right hand grip. The lever has ample overtravel to avoid hand fatigue of the operator. The electric cable is 16 gauge, 3 wire with gray non-marking cover. A large, soft rubber bumper protects both machine and furniture. Non-marking wheels make rolling and moving very easy. Tornado 130 is powered with a ½ H.P. capacitor start motor with a very high starting torque. The machine comes complete with brush and has a total weight of 51½ lbs.

COLD PROCESS ROOFING

(Use Key # 906 on Inquiry Card on page 35)

A NEW process by which new roofs can be installed right over old ones has been announced by The Monroe Company, Inc. Known as the "Cold Process Roofing" system, the method eliminates the necessity and expense of removing old roofs before work can be begun on new built-up roofs. It also does away with heating of the roof coating, hot mop applications and the use of gravel. Fire danger is said to be completely eliminated.

Key to the process, commonly referred to as CPR, is the use of 3 newly-developed Monroe roofing products. Among these are Hold-Tite, an adhesive sealing cement which welds new felt to the old surface and also bonds individual felt plies firmly together. Another is Monroe heavy-duty cold process 53 lb. roofing felt, asphalt-saturated and compatible with both Hold-Tite and Siliconed Rufferseal roof coating. The latter is spread completely over the repaired surface as the final step in the

installation of the new built-up roof. It is composed of long fibre Canadian asbestos, imported and domestic asphalts and special penetrating oils. Siliconed Rufferseal, and a companion product, Siliconed Asbestolite, are said to be the only roof coatings that now are compounded with silicones. Asbestolite, which can be used in the "CPR" instead of Rufferseal, contains tiny pure metallic aluminum flakes which rise to the surface, "leaf" and produce a brilliant, attractive aluminum roof. The Cold Process Roofing specifications can be applied to the construction of both single ply and 2-ply built-up roofs.

TELEPHONE CIRCUIT ALARM SYSTEM

(Use Key # 907 on Inquiry Card on page 35)

PATENTS on equipment which will superimpose alarm and synchronization signals over existing telephone circuits without interference with their regular use, have been acquired by Koiled Kords, Inc. A simple transistorized, dry cell battery-powered signal transmitter, is installed on the premises and, when actuated, transmits a high frequency signal over regular telephone circuits to the central office. Special receiving and amplifying equipment in the central office in turn transmits the signal to a telephone answering service or police station over a regular circuit. Use of this equipment eliminates the necessity for special leased wires now being employed for this type of service and broadens its potential use because of this economy.

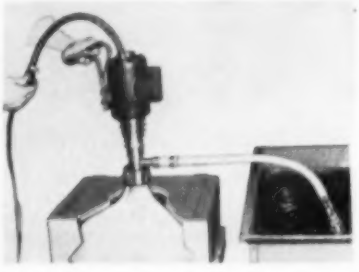
It is necessary that telephone companies file special rates covering this "super-imposed" type of service. When such rates are established, Koiled Kords, Inc., will be in a position to furnish the necessary equipment to utilize this service, which can be installed anywhere a telephone is or can be installed. It is expected that many telephone companies will employ equipment of this nature for coin box protection within their own systems prior to establishing rates for leasing lines to operating alarm companies. It is anticipated that small telephone companies may elect to add alarm service themselves and operate the entire system instead of leasing circuits to a separate company. Koiled Kords, Inc., has formed a wholly owned subsidiary called The Electronic Alarm and Signal Co., Inc., in Beverly Hills, California, as a pilot operation to prove-in the operational features of this new patented equipment.

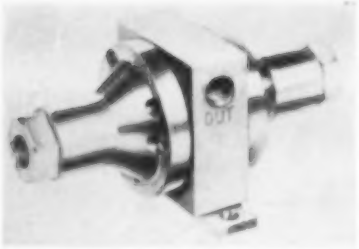
PORTABLE ACID PUMP

(Use Key # 908 on Inquiry Card on page 35)

THE Thompson Manufacturing Co. has introduced an acid pump that is power-driven and portable, designed to safely transfer acids from standard carboys and drums as well as from small, open, plating and storage tanks. Known as the Centri-F Acid Pump, it is driven by a totally enclosed, ¼ H.P., 115 V, 60 Cycle, 3450RPM motor. The pump delivers a smooth, spurt-free flow of acid at the rate of approximately six gallons per minute.

Although designed to operate at floor level, the pump is said to operate at near full capacity under a six foot head of acid. The outside diameter of the intake tube is 1⅜", fitting the opening of almost any standard carboy and drum. The length of the intake tube, below the spout, is 23", which permits it to be inserted into a 13 gallon glass carboy, just short of striking the glass bottom. When used for open tanks, the pump is lowered into the tank as the level of the acid recedes. Additional sections of overflow tubing, complete with couplings, are available. The pump is constructed of stainless steel, teflon, and polyetheylene.





MACHINERY HAND-GUARD VALVE

(Use Key # 909 on Inquiry Card on page 35)

A NEW N-T-D (Non-Tie-Down), and a pair of pilot valves, to provide two-hand safety for operators of presses, brakes, shears, and other machines, have been announced by Ross Operating Valve Company. Two-hand safety is accomplished with the Non-Tie-Down Valve interposed between two palm button three-way valves in parallel and the receiver that is to be alternately pressurized and exhausted. If the machine operator engages or disengages only one of the pair of palm button valves, the N-T-D valve will automatically cut off any subsequent air flow through itself to the receiver. Recocking of the N-T-D Valve for safe two-hand operation can then be accomplished only by releasing the engaged pilot valve.

To permit a reasonable delay between engagement of one palm valve and the other, a tamper-proof integral adjustment is provided in the N-T-D Valve. The N-T-D, double palm button pilot circuit is applicable to most air-operated single stroking machinery.

SOUND ABSORBING ENCLOSURE

(Use Key # 910 on Inquiry Card on page 35)

KOPPERS Co., Inc., Industrial Sound Control Dept., has developed a partial enclosure sound panel booth to reduce the noise level of planishing hammers, milling and grinding machines, small drop hammers, punch presses, etc. The open front booth is constructed of 3½" thick panels whose inside surface is of perforated sheet metal; the outside surface is of a solid sheet metal. A sound absorbent blanket, with a noise reduction coefficient of 95 percent, separates the two sheets.

In a recent test, utilizing a pair of enclosures, noise reduction was determined in octave bands, and measurements were made at different positions: machine operator (noise was reduced from 4 to 11 db. throughout the frequency range); machine operator in adjacent booth (noise was reduced 16 db. or more); 10 ft. in front of each booth (noise was reduced 5 db. or more in ranges above 300 cps.)

Also developed and tested were portable sound panels that can be rolled into position between machines as required, or converted to partial enclosures. The panels are 8 ft. square by 3½" thick. When used separately, they provide little noise reduction for the machine operator himself, but the panels are said to reduce the reverberent noise for adjacent areas.

SELF-PROPELLED FLOOR SCRUBBER

(Use Key # 911 on Inquiry Card on page 35)

A SELF-PROPELLED, automatically operated floor maintainer designed for large floor areas has been introduced by Clarke Sanding Machine Company. The unit, named the ClarkeAmatic, cleans 10 to 20 times faster than ordinary mopping, according to the manufacturer. Electrically powered, and also available in propane and gasoline powered models, it automatically meters solution to its twin brushes, scrubs, rinses, picks up dirt and solution, and dries, all in one operation.

The unit is available in two sizes, with 26" and 30" brush spreads. Both machines have two forward speeds, 133 and 183 lineal feet per minute. Features include a concealed cable reel which allows clear forward vision for the operator; controlled brush pressure ranging from 0 to 200 pounds; easy maneuverability. Capacities

of the clean water and vacuum tanks are 20 gallons and 18 gallons respectively. Drive motor of the large model is 1½ H.P. The smaller model has 1 H.P. unit. Both motors are 115/230 volt, AC 60 cycle ball bearing, capacitor continuous duty, resilient mounted units. The solution control handle is mounted within operator's easy reach. It regulates a double discharge valve which meters solution to each brush in equal amounts.

The vacuum pick-up motor on both models is a ½ H.P. constant duty, by-pass, moisture proof, rubber-mounted unit. As well as being equipped with filter to eliminate radio reception interference, it is quiet in operation and provides 63 inches of water lift with closed orifice, the company claims. The large model is said to scrub up to 28,000 sq. ft. per hour, while the 26" unit scrubs up to 24,420 sq. ft. per hour.

NON-SKID ALUMINUM TREAD

(Use Key # 912 on Inquiry Card on page 35)

A NON-SKID abrasive aluminum tread plate that provides sure footing even when covered with oil, grease or water, is being marketed by Aluminum Company of America. The slip-proof abrasive plate is designed for such critical items as bus steps and aisles, marine and printing press catwalks, passenger trains, and truck and trailer floors.

The product is rolled from ingot by a method which provides a fused aluminum abrasive oxide on one surface of the plate. The layer of abrasive is metallurgically bonded to the aluminum plate. In welding, for instance, the abrasive layer does not separate from the plate. The non-skid surface has proved valuable in preventing slippage on trucks carrying wet cargoes, at industrial locations where oil or ink may collect on floor surfaces, on military and civilian bridge walkways, in food processing plants and sewage disposal units. Durable and corrosion-resistant, it can be shop fabricated by most commercial methods, including shearing, sawing, punching and drilling.

HIGHWAY WARNING KIT

(Use Key # 913 on Inquiry Card on page 35)

A WARNING device that flashes intermittent red warning signals, said to be visible for one mile in all directions, has been developed by Pioneer Signalite Co., Division of Angelus Aircraft, Inc. Having no connecting cords or wires, Fyr-Fly can be placed any distance from a truck to warn oncoming traffic. The device is compact, ruggedly built and is rain, dust and explosion proof. No adjustments of any kind are ever necessary, the manufacturer claims.

Fyr-Fly is offered in kits containing a set of 3 warning lights, plus a companion piece called Kandelite, a steady white utility light which may be used anywhere (around the car for motor repairs, flat tires, etc.) Both operate on standard dry cell batteries and will operate in excess of 36 hours continual use, an equivalent of a year's normal use.

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CESCO Spectacle-type Goggles

. . . for safety, comfort, styling, and durability

CESCO Comfort-Bridge Spectacle-type Goggles are impact-resistant, strong, and durable. The comfort bridge makes for greater wearer comfort and is an important safety factor. Bridge pads are offered in a choice of rigid or flexible plastic. Sideshield models (illustrated) afford extra protection from objects striking from the side.

Other CESCO models which have proved valuable in all types of industrial use are shown. For complete information and prices on the complete CESCO line, we invite you to contact your nearest Distributor.

Send for this catalog.

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CESCO

FOR SAFETY

(For details, use Key # U-28 on card on page 35)

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